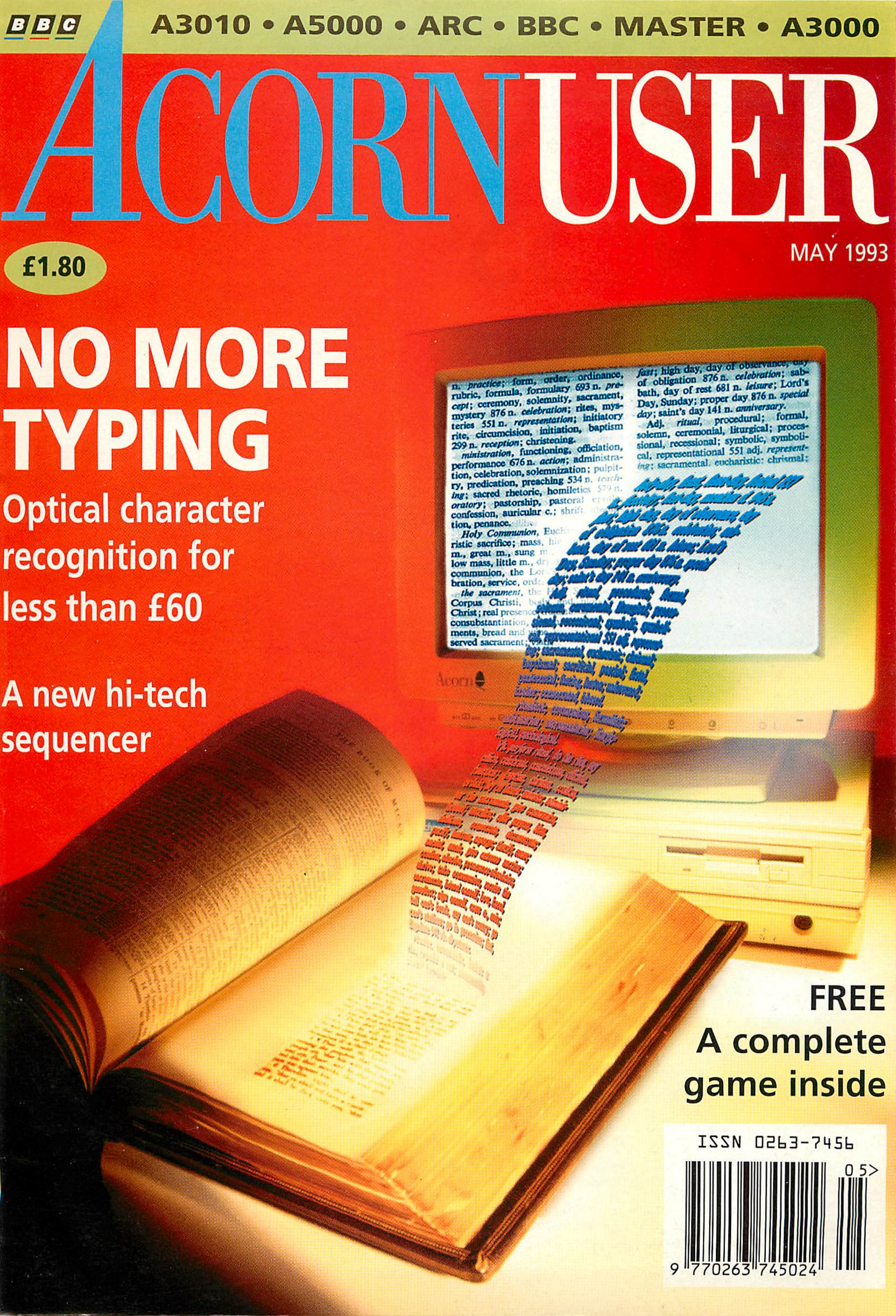
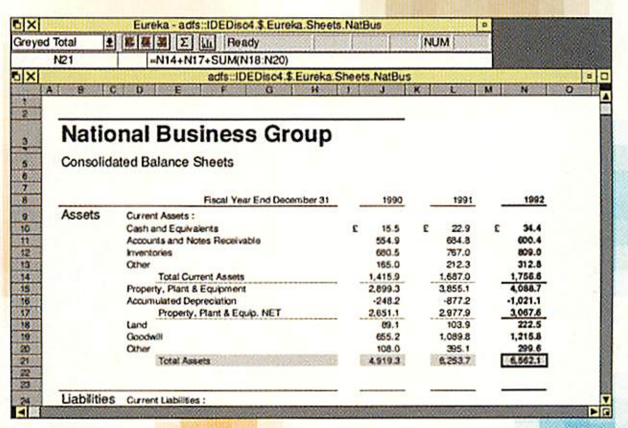
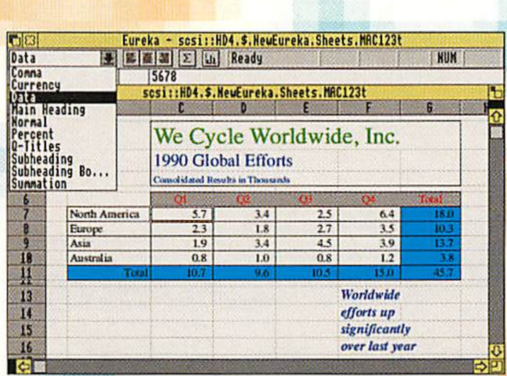

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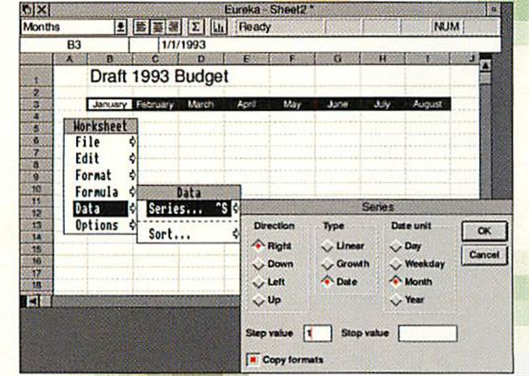
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MEAN B



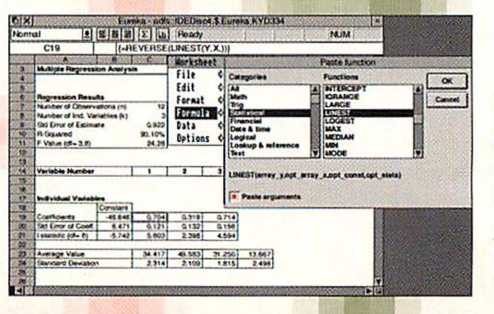
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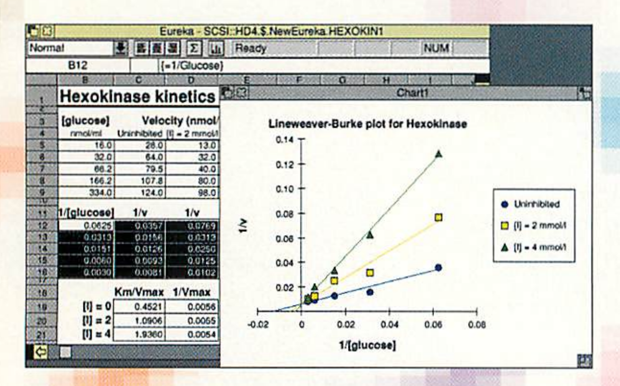


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TANH ASINH
ACOSH
ATANH
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ATAN2

Information
NA ISNA
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ISNONTEXT
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TYPE
ERROR.TYPE
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COLUMN
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Statistical
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COMBIN SUM
MAX MIN
AVERAGE
COUNT
COUNTA
AVEDEV
MEDIAN
MODE RANGE
IQRANGE
QUARTILE
LARGE SMALL
STDEV STDEVP
VAR VARP
GEOMEAN
HARMEAN
NRAND SLOPE
INTERCEPT
CORREL
COVAR LINEST
LOGEST
TREND
GROWTH

Mathematical
RAND ABS
INT SIGN EXP
LN LOG10
SQRT FACT
FRACTION
EVEN ODD
LOG MOD
ROUND
TRUNC
CEILING
FLOOR
RANDBETWEEN
PRODUCT
SUMSQ
SUMX2PY2
SUMX2MY2
SUMXMY2

Matrix
TRANSPOSE
MDETERM
MINVERSE
MMULT

Logical
FALSE TRUE IF
AND OR NOT

Time
NOW TODAY
DAYS360 DAY
HOUR MINUTE
MONTH
SECOND
WEEKDAY
YEAR DAYS
DATE TIME

String
CHAR FIXED
DOLLAR
CLEAN CODE
LEN LOWER
TRIM UPPER
PROPER
DATEVALUE
TIMEVALUE
VALUE RIGHT
EXACT LEFT
REPT TEXT
FIND SEARCH
MID REPLACE
SUBSTITUTE

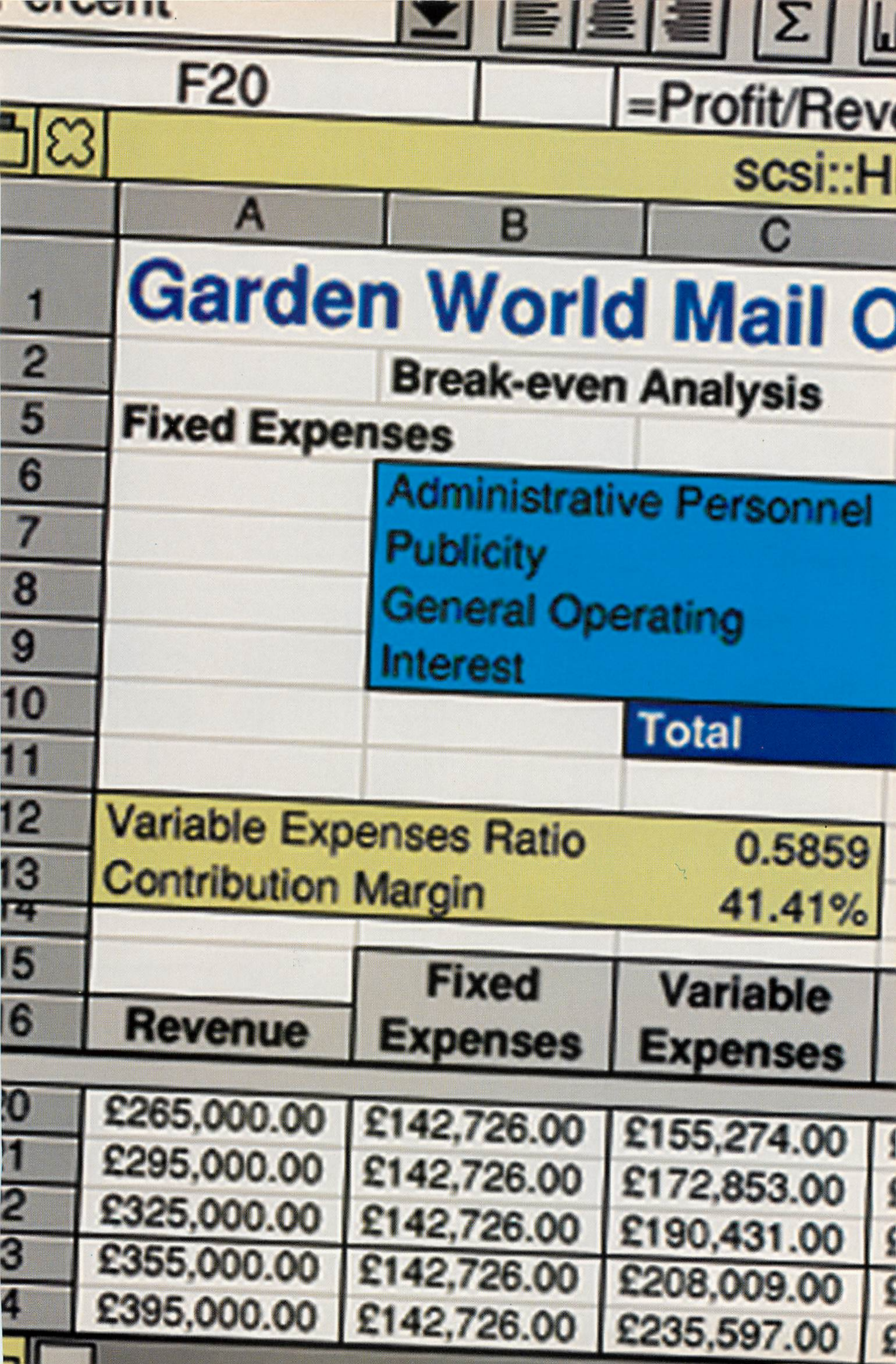
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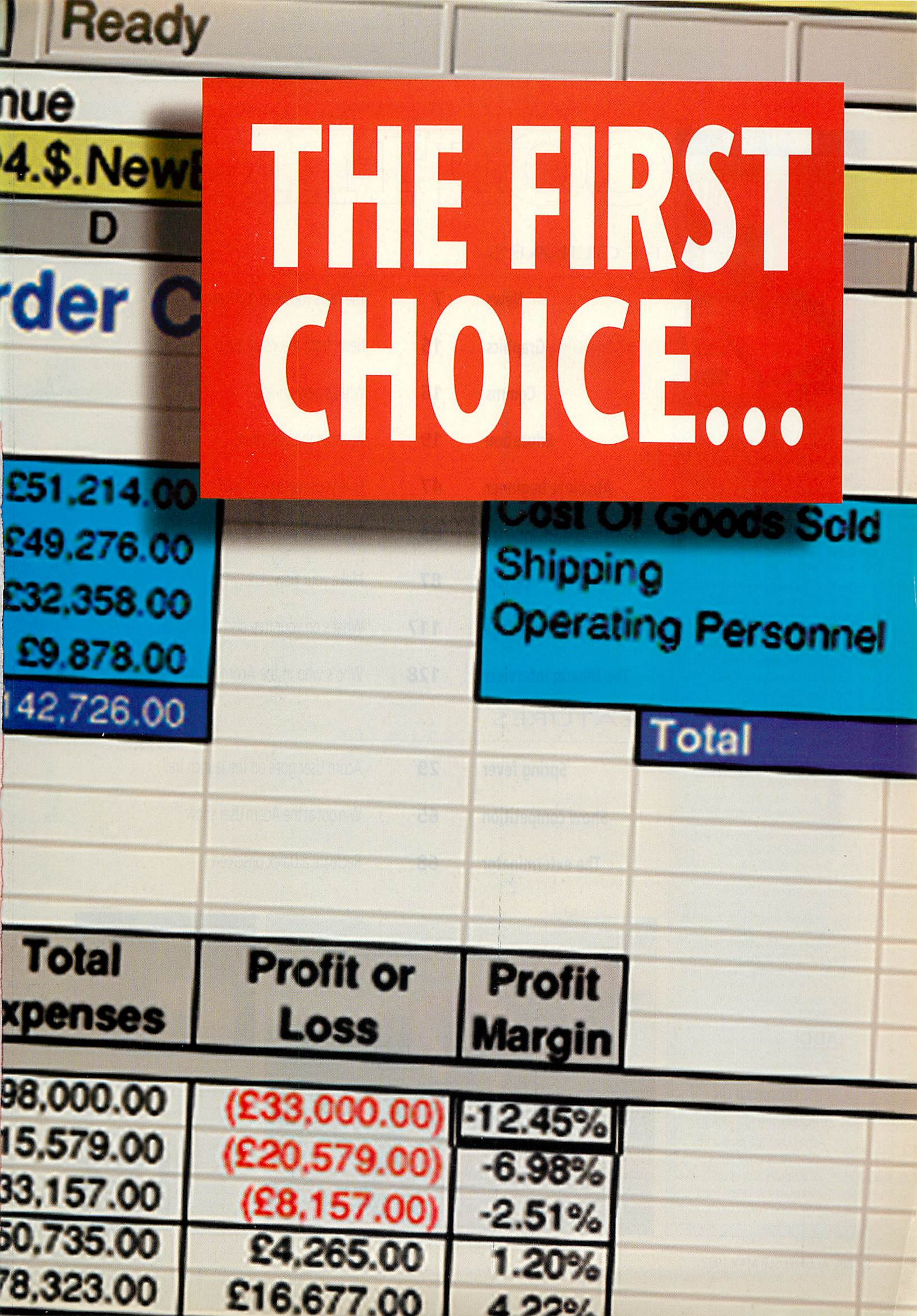
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INDEX
HLOOKUP
VLOOKUP
LOOKUP
MATCH

Miscellaneous
REVERSE

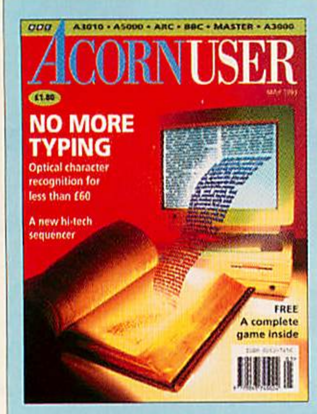


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A
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Garden World Mail O
Break-even Analysis
Fixed Expenses
Administrative Personnel
Publicity
General Operating
Interest
Total
Variable Expenses Ratio
0.5859
Contribution Margin
41.41%
Revenue
Fixed Expenses
Variable Expenses
£265,000.00
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£142,726.00
£172,853.00
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£4,265.00
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ACORN USER



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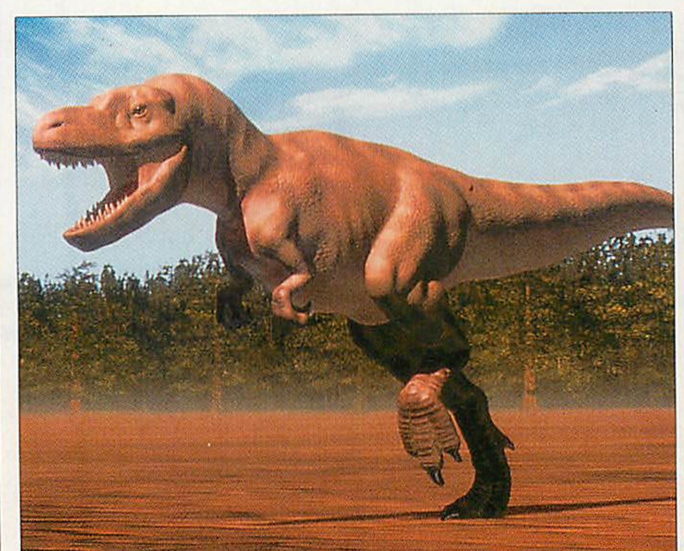
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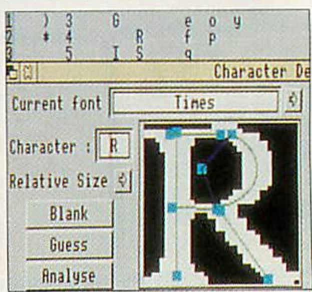
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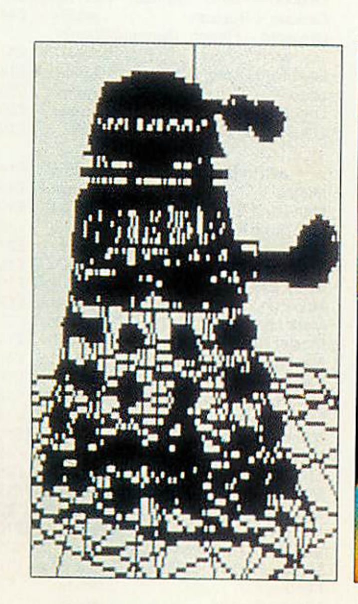


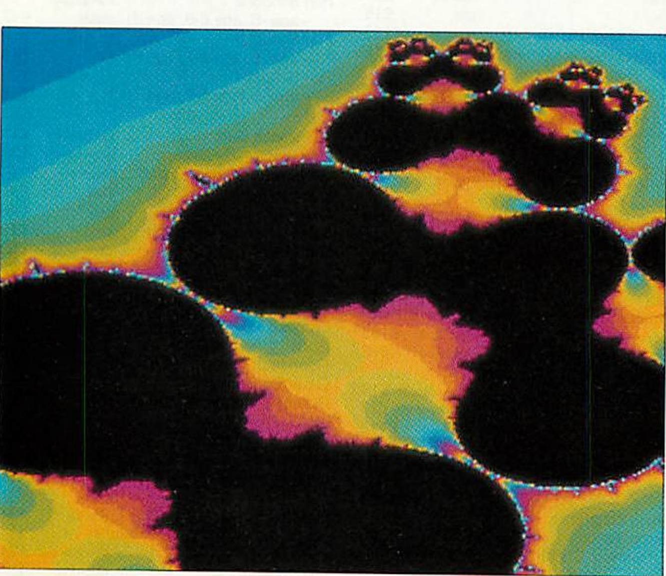


MAY 1993

REVIEWS

PROGRAMMING





EDITOR'S LETTER

In the *Acorn User* office, we know when it's Spring by the size of our postbag. Just one morning in March brought us preview copies of *Knowledge Organiser 2, Serenade, ProArtisan 2* and the finished version of *Topographer* through the door, so we know that all must be well in the Clares camp. The battle for business supremacy is hotting up with the finished version of *Wordz* from Colton, to be followed soon by the spreadsheet *Resultz*.

And this is only the tip of the iceberg. There are countless other products vying for our attention, which we will be taking a closer look at over the following few months.

So what is the cause of all this springtime activity? Well, we like to think that the *Acorn User* Spring Show on 16 April has done its bit for the cause. There are plenty of new products planned for the show and we give you a last-minute run-down of the exhibitors on page 65.

Plus, on the back page there is a peer into the the secret life of a product developer. Is planning and implementing a new release really fraught with tension and drama, or is it all one big yawn? Here is your chance to find out.

Finally, with a look at the latest development in OCR reviewed on page 21, we find copy typing for Acorn owners could become a thing of the past.

Hope you enjoy the issue and the merry month of May.

IC. Donaghay

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SOFTWARE

APRIL 1993

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Nature Graphics, draw/sprites — Micro Studio — £16
Naughty Stories (set of 6) — Sherston — £48
Navigator — Topologika — £39
Nebulus — Krisalis — £19
Newton — Longman — £20
Night Sky — Clares — £67
Nominal Ledger — Minerva — £78
Noot — 4mation — £41
Noot Art Disc — 4mation — £10
Notate — Longman — £42
Note Invaders — Chalksoft — £20
Number 62 Honeypot Lane — Resource — £29
Numbers and Pictures — Chalksoft — £20
Numberscope — Fisher-Marriott — £19
Number Zoo, age 3-6 — Selective — £14
Numerator — Longman — £39
Numerator Chaos — Longman — £18

Oak Logic — Oak — £79
Oak PCB — Oak — £79
Oh No! More Lemmings (requires Lemmings) — Krisalis — £15
Ollie Octopus' Sketchpad, age 4+ — Storm — £14
Omar Sharif's Bridge — Krisalis — £22
Order Processing/Invoicing — Minerva — £78
Orion — Minerva — £8
Orrery — Spacetech — £93
Ovation — RISC — £85
Overload — Clares — £13

Padlock — ICS — £10
– site licence — £30
Pandora's Box — Fourth Dim — £18
Pappus — Computer Tutorial — £17
Paradroid 2000 — Coin-Age — £22
PC Access — Minerva — £19
PC Emulator 1.8 — Acorn — £89
PDT — Oak — £149
Pendown — Longman — £46
Pendown Etoiles — Longman — £49
Pendown Outline Fonts — Longman — £19
Pendown Plus — Longman — £68
Personal Accounts — Apricote — £29
Perspectives — TechSoft — £44
Pesky Muskrats — Coin-Age — £19
Phonic Games — Fisher-Marriott — £28
Picture Book — Triple R — £15
Picture It! — Appian — £29
– Topic discs — each — £9
PinPoint — Longman — £65
– site licence — £390
PipeDream 3 — Colton — £72
PipeDream 4 — Colton — **£119**
PipeDriver Dot 1 — ICS — £10
Pipe Mania — Empire — £18
Pirate, age 8-14 — Chalksoft — £19
Placard — ICS — £10
– site licence — £30
Plague Planet — Alpine — £13
PlayBack — RISC — £19
Play It Again Sam 1 — Superior — £20
Plot — Clares — £POA
Podd — ESM — £25
Polyominoes — Topologika — £29
Populous — Krisalis — £22
Poster — 4mation — £75
PowerROUTER — Silicon — £159
Prehistoric Animals, sprites — Micro Studio — £16
Premier — Circle — £71
– DataBase — Circle — £25
– WordProc — Circle — £25
Presentation Task Force — £POA
Presenter GTi — Lingenuity — £66
PrimeArt — Minerva — £69
PrimeMover — Minerva — £POA
PrimeWord — Minerva — £54
Printer Drivers, RISC OS:
BJ-10ex / BJ-200 TurboDriver + Cable — CC — £42
BJC-800 TurboDriver + Cable — CC — £89
Canon BubbleJet, Canon LBP, Canon PJ1080, ColourCel, Epson JX, Epson ESC-P2, HP, Integrex 132 – each — Ace — £19
Deskjet 500C, Epson / Star colour – each — RISC — £15
ProDrivers: Canon LBP, Epson ESC-P2, HP Colourjet – each — Ace — £37
ProArtisan — Clares — £71
ProArtisan 2 — Clares — £POA
ProCAD — Minerva — £394
Programming in ANSI Standard C on the Archimedes — Sigma — vo £15
Prophet (requires 2 Mb) — Apricote — £132
Prophet Demo — Apricote — £10
Protext — Arnor — £117
Provocator — Computer Tutorial — £15
Puncman 1 and 2 — Chalksoft — £16
Puncman 3 and 4 — Chalksoft — £16
Puncman 5 to 7 — Chalksoft — £18
Punctuate — Xavier — £31
Punctuate! — Topologika — £25
Purchase Ledger — Minerva — £78

Quest for Gold — Krisalis — £19
QuicKey — ICS — £10
– site licence — £30

Real McCoy 2 — Fourth Dim — £25
Real McCoy 3 — Fourth Dim — £25
Real McCoy 4 — Fourth Dim — £25
Recall, age 8-13 — Sherston — £39
Redshift — Minerva — £10
Render Bender 2 — Clares — £78
Reporter — Minerva — £29
Repton 3 — Superior — £14
Resultz — Colton — £POA
Revelation 1 — Longman — £39
Revelation 2 — Longman — £75
Revelation 2 CD Rom — Longman — £98
Revelation ImagePro — Longman — £127
Reversals — Chalksoft — £17
Rhapsody 2 — Clares — £45
Rhapsody 3 — Clares — **£79**
Rhythm-Bed — Clares — £39
RiscBASIC Compiler — Silicon — £79
RiscForth Compiler — Silicon — £79
Risc OS Companion Vol 1 — Oak — vo £49
Risc OS Extras 1992 — Acorn — £9
Risc OS Programmer's Reference Manual — Acorn — vo £79
Risc OS Style Guide — Acorn — vo £11
RoboLogo — Silicon — £39
Round the World Yacht Race, age 9+ — Storm — £27

Sales Ledger — Minerva — £78
Saloon Cars Deluxe — Fourth Dim — £25
– Deluxe Extra Courses — Fourth Dim — £16
S-Base Developer — Longman — £175
S-Base Developer Plus — Longman — £275
S-Base Personal — Longman — **£95**
Schema — Clares — £95
Schema 2 — Clares — £POA
Science, drawfiles — Micro Studio — £25
Score Draw — Clares — £44
Scorewriter — EMR
– PMS Dot matrix, Version 1 — £127
– PMS Dot matrix, Version 2 — £147
– PMS PostScript — £422
ScreenPlay — Widgit — £35
ScreenTurtle — Topologika — £44
Search and Rescue, age 9+ — Storm — £27
Seashore Guide, drawfiles — Micro Studio — £16
Serenade — Clares — **£109**
Sesame Street — Electric Crayon
– Letters for You — £16
– Numbers Count — £16
ShapeFX — Data Store — £10
ShareHolder — Silicon — £106
ShareHolder Professional — Silicon — £234
Shylock Gnomes, age 10-15 — Selective — £16
Sim City — Krisalis — £24
SkyHunter — Longman — £22
smArt — 4mation — £50
smArt Aliens, Animals, Dinosaurs, Egypt, Faces*, Fantasy, Fashion, Fiddles & Drums, Heraldry, Homes*, Leisure*, Look Smart, Smartoons, Trees and Gardens *Please specify English, French, German, Spanish or Welsh – each — 4mation — £15
smArtFiler — 4mation — £32
smArt Modern Languages — 4mation — £19
Smudge the Spaniel, age 4-8 — Storm — £20
Snippet (new version) — 4mation — £32
Soapbox — Xavier — £34
SolidCAD — Silicon — £79
SolidsRender — Silicon — £79
SolidTools — Silicon — £234
Sound Engineer — EMR — £69
Sound FX Maker — CIS — £31
Spark — David Pilling — £5
SparkFS — David Pilling — £20
Sparkle — Morley — £59
Special — ICS — £10
– site licence — £30
Speech! — Superior — £14
Spelling week-by-week — Chalksoft — £21
Spex — ExpLAN — £98
Spheres of Chaos — Matt Black — £19
Splash, age 7-11 — Sherston — £19
Splice — Ace — £29
Split an Image — Sherston — £15
Spoken Word — Wyddfa — £16
Spooler — Computer Tutorial — £9
Sporting Triangles — CDS — £19
SportsDay — Selective — £22
SportsPeople — Selective — £22
SpriteEd — Computer Tutorial — £17
SpySnatcher — Topologika — £12
Square Route — Computer Eyes — £16
Starspell Plus — Fisher-Marriott — £19
StartWrite — Icon — £55
Stock Management — Minerva — £78
StockPack — Topologika — £37
Studio24Plus Version 2, age 11+ — EMR — £149
Studio24Plus Version 3, age 12+ — EMR — £210
SUMthing — Resource — £19
SuperDump — Silicon — £20
Superior Golf — Superior — £14
SuperPlot — Silicon — £20
Supersounds — CIS — £15
Supersounds 2 — CIS — £15
Swiv — Krisalis — £19
System Delta Plus II — Minerva — £50
– Reference Guide — Minerva — vo £25

TABS — ExpLAN — £95
Talisman — Minerva — £8
Talking Pictures — Wyddfa — £16
Target Maths — Triple R — £15
Technodream (Nevryon 2) — Superior — £20
TechWriter — Icon — **£159**
Thinklink — Xavier — £29
ThinkSheet — Fisher-Marriott — £38
Thundermonk — Minerva — £11
Tiles — Brain Games — £16
Timeshare — Fisher-Marriott — £19
Timetabler — Minerva — £549
Time Traveller — ESM
– Britain Since the 1930s — £27
– The Victorians — £POA
TinyLogo/Draw — Topologika — £34
TinyPuzzle — Topologika — £24
Titler — Clares — £119
Toolkit Plus — Clares — £36
Tools Graphics, drawfiles — Micro Studio — £23
Top Banana — Hex — £19
Topographer — Clares — £67
Touch Type — Iota — £39
Tower of Babel — Cygnus — £17
Trace — David Pilling — £5
Tracer — Midnight — £46
Tracker — Leading Edge — £37
Transport, drawfiles — Micro Studio — £25
Turbo Type — CIS — £20
Tween — Ace — £28
Twin — Acorn — £24
Twin World — UBI Soft — £14
TWO (Task and Window Organiser) — ICS — £10
– site licence — £30
TypeStudio — RISC — £39

Utility Disc 1 — Data Store — £8
Utility Disc 2 — Data Store — £13
Utility Disc 3 — Data Store — £7
Utility Collection — Data Store — £21

Vector — 4mation — £75
View»Mac 3 — Human — £65
– Arc/Mac Cable — Human — £24
Viewpoints, age 7-12 — Sherston — £37
Vox Box — Clares — £46

Waterloo (not OS 3.1) — Turcan — £19
Whale Facts — Topologika — £34
WindowEd — Armen — £27
Word Bank — Topologika — £25
Words and Pictures — Chalksoft — £18
WordWorks — CC — £38
Wordz — Colton — **£89**
World Geography Maps, draw — Micro Studio — £23
World Map Study, age 7-16 — ESM — £42
Worldscape — Leading Edge — £17
World Wildlife, sprites — Micro Studio — £16
Worra Battle — Oak — £15
WorraCAD — Oak — £79

Yacht 2 — Computer Tutorial — £49
Yacht 7 — Computer Tutorial — £94

Zarch — Superior — £14
Zelanites (not OS 3) — Micro Power — £15

HARDWARE

MEMORY . . .

Fitting extra unless otherwise stated
† Fitting easy ‡ Fitting needs expertise

A3000 2 Mb Upgradable † — Atomwide/IFEL — £45
A3000 4 Mb † — Atomwide/IFEL — £110
A3010 1-2 Mb — **£39**
A310 2 Mb Upgradable soldered ‡ — IFEL — £88
– as above + MEMC1a — £124
– as above + MEMC1a + fitting — £154
A310 4 Mb soldered + MEMC1a ‡ — IFEL — £180
– as above + fitting — £210
A5000 2-4 Mb Non-upgradable † — Atomwide — £85
A5000 2-4 Mb Upgradable † — Atomwide — £99
A5000 2-8 Mb including fitting — Atomwide — £500

ICS

051-625 1006

A5000 4-8 Mb including fitting — Atomwide — £391
A540 4 Mb † — Atomwide — £POA

COMPUTERS . . .

A3010 1MB FD Family Solution — Acorn — £420

Family Solution + ideA

Special price when you buy an A3010 with an ICS internal hard disc upgrade:
– Family Solution + 20 Mb hard disc — £599
– Family Solution + 60 Mb hard disc — £675
– Family Solution + 80 Mb hard disc — £715
– Family Solution + 120 Mb hard disc — £799

A3010 2MB FD Learning Curve with Monitor — Acorn — £675
– as above + JP150 Printer — £889
A3020 2MB FD — Acorn — £749
A3020 2MB HD60 — Acorn — £899
A4 2MB FD — Acorn — £1395
A4 4MB HD60 — Acorn — £1695
A4 4MB HD80 — Acorn — **£1699**
A4 4MB HD120 — Acorn — £1799
A4 Extra Battery Pack — Acorn — £50
A4 Shoulder Bag — Acorn — £35
A4000 2MB HD80 — Acorn — £945
– as above + Home Office — £995
A5000 2MB HD80 Multiscan — Acorn — £1395
– as above + Learning Curve — £1455
Pocket Book — Acorn — £212

MISCELLANEOUS. . .

386 PC Expansion Card 25 MHz — Aleph One
– 1 Mb — £374
– 4 Mb — £468
486 PC Expansion Card — Aleph One
– 1 Mb — £463
– 4 Mb — £557
4-slot 4-layer Backplane — IFEL — £57
9060S Monitor — Eizo — £450
A300/400 Fan kit — ICS — £15
A3000 Expansion Box — Wild Vision — £135
A310 RISC OS Carrier Board ‡ — IFEL — £21
A5000 Fitting Kit for second hard disc — ICS — £15
Arckey Function KeyStrip Holder — ICS — vo £3
– pack of 4 — vo £10
ArcNET — ACS — £69
ARM3 ‡ — Aleph One/IFEL — £175
ColourCard — CC — **£225**
– A3000 External — CC — £225
Dongle Dangle with screw fittings — ICS — £6
Fan filters (pack of 10) (not A5000) — ICS — £6
FaxPack — CC — £289
Floppy Discs, 10 × 3½" High Density — £10
G8 Plus — State — £238
G8 Plus Video Switch — State — £23
G8 Professional — State — £348
HiPoint Mouse for A4 — Genius — £49
Micro Mouse — Clares — £26
Monitor Stand for A3000 — ICS — £21
Podule Case for A3000 — HCCS — £16
RISC OS 3 Upgrade — Acorn — £41
– Bulk package — Acorn — £335
– A5000 — Acorn — £17
Seal 'n Type spill-proof Keyboard Covers
– Archimedes / A5000 — Kador — £14
– A3000 — Kador — £14
TouchWindow — Lindis — £234
Whisper Fan Quietener (for A300/A400 series only) — ICS — £15
Wizzo IDE Filing System on rom — ICS
– Wizzo4 for A4 — £29
– Wizzo5 for A5000 — £29

I²C PRODUCTS . . .

AnDi Odule — Baildon — £39
I²C Adaptor (needed unless you already have an I²C socket) — Baildon — £10
I²C SWI (enhanced IIC_Control) — Baildon — £15
– bought with Odule — £5

For ordering details please turn to page 3



TESCO OFFERS SCHOOLS BARGAINS

ONCE again, schools are preparing to go to extraordinary lengths to cash in on this year's Tesco deal. As it did this time last year, Tesco will donate a voucher, exchangeable for Acorn software and hardware, for every £25 spent in one of its stores.

This year, the scheme promises to be even more successful than it was last time. 'Last year the scheme was a bit of an unknown quantity and people were wary of its value. This year, schools are well prepared to get out there and really motivate their local communities to collect as many vouchers as possible.' said a Tesco representative.

The 1993 scheme was launched by Sarah Green, the BBC presenter of *Going Live*. Schools have until May 23 to collect Tesco vouchers and vouchers can be donated to your chosen school; you don't have to be a parent or teacher to join in.

Acorn User will be doing its bit and collecting for a local London school, so if you have any spare vouchers out there, send them into us at Tesco Offer, *Acorn User*, Redwood Publishing, 101 Bayham Street, Camden Town, London NW1 OAG.



Tesco's voucher scheme covers even more products than last year

This year's Tesco scheme covers a much wider range of Acorn products. The A4 portable (5,800 vouchers), PocketBook (1,200 vouchers), A3020 2Mb HD60 (3,500 vouchers), and CD-Roms are all included. For a full-colour brochure about the scheme, contact the Computers for Schools office at 59 Russell Square, London WC1B 4HJ.

BEEB HACKER ACQUITTED

IN A celebrated court case that has furnished the basis of a contemporary moral panic, Paul Bedworth, a hacker who used his BBC Model B to infiltrate computer systems all over the world, has been found not guilty on all counts.

Bedworth admitted to unauthorised use of computers and telecommunications services including systems at *The Financial Times*, European Community offices, universities and medical bodies.

While there is no doubt that Bedworth's activities caused many of these bodies considerable financial outlay – including £20,000 in phone bills by the *FT* – his successful defence case was based on the idea that he was an obsessive and compulsive personality incapable of social skills; hence he related only to computers and people he communicated with via bulletin boards.

The result has been a spate of scare stories that may have brought a smile to the lips of many Beeb owners. Possibly the most lurid headline, 'Computers turned my son into a robot', was featured in the *Daily Mirror*, but most of the major dailies managed to work themselves up into a self-important frenzy.

So ask yourself: do you spend a little too much time with your model B? If so, isn't it time you upgraded to 32-bit?

COMPUTER LOGIC

RMD, a new software company producing programs for the Archimedes, has been set up by two electronics engineers, Roy McDermott and Mark Derbyshire, to produce logic training software for those studying electronics.

RMD's first release is *LogiSim*, a digital logic simulator. Two and three input AND, OR, NAND, NOR, EOR gates plus NOT, JK flip-flop, low frequency clock source, counters, LEDs and switches are emulated. *LogiSim* is priced at £10 including P&P, and is available from RMD at 12 Padstow Road, Greasby, Wirral, L49 3AQ.

IN BRIEF

● Acorn will again be exhibiting at this year's Ideal Homes Exhibition at Earls Court in London. The Acorn stand (312C) is on the first floor of the exhibition centre and features the usual array of Archimedes computers, plus Lotus Turbo Challenge and a special section dedicated to Midi music making. The exhibition runs until 12 April.

● Apricote Studios, which hails from Manea near Cambridge, has netted a prestigious deal in New Zealand. Apricote's *Prophet* accounting package is to be bundled by Acorn New Zealand in its A4000 Home Office promotion.

Prophet will complement Icon Technology's *EasiWriter 2*, which is also featured in the Home Office System. The two applications work together using a mail merge feature. Australian, New Zealand, Canadian and Dutch versions of *Prophet* now supplement the UK version. Apricote is on (0354) 78432.

● Two new software releases for the education market have been released by Selective Software. *Number Zoo*, aimed at children between ages 3 and 6, is a program for initial teaching of numbers. Graphical games help to maintain kids' attention.

Number Zoo is priced at £16.45 inclusive. *Sports People* is a management program for schools and clubs to plan and organise sports events around individual competitors. The package is designed to complement the earlier *Sports Day* package which managed team events. *Sports People* is priced at £26.44 inclusive and is compatible with Risc OS 3.1. Selective Software can be contacted on (0458) 43079.

● PDK Technologies has announced *HelixLogic*, an editing environment for designing electronic logic gate layouts. *HelixLogic* can also simulate a design and allow input states to be changed and and so reveal any resulting changes. Layouts can be exported in *Draw* file format and truth tables are automatically generated. *HelixLogic* is priced £24.95. For further details call PDK on (0525) 403541.

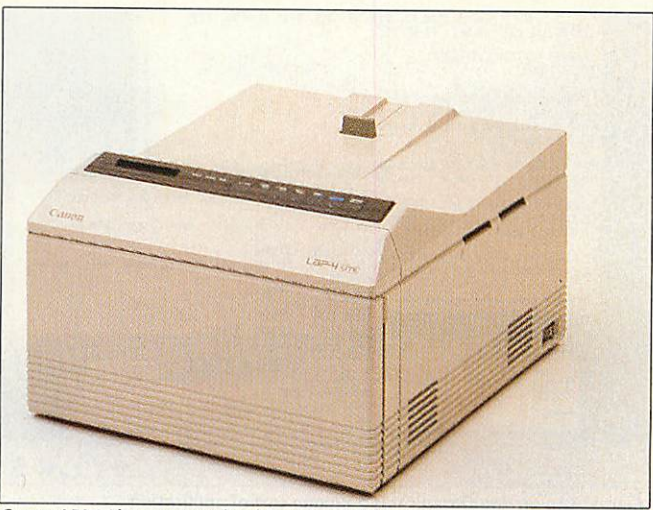

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LASER PRINTING FOR LESS OUTLAY

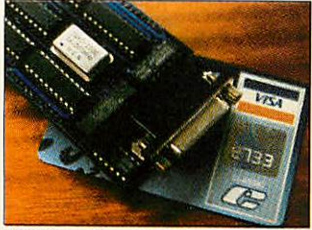
HCCS intend to reduce the price of their latest card by £100 when it is launched at the *Acorn User* Spring Show in Harrogate.

The new Laser Express direct-drive printer card allows the use of one of the least expensive laser printers around: the Canon LBP4 model called the Lite, which costs around £500 .

Laser Express is compatible with low-priced Canon LBP4 Lite printers thanks to a new video interface. Laser Express are also the first direct drive laser printer controller card that can be fitted to practically any 32-bit Acorn machine, with the only notable exception being the Acorn A4 laptop. This flexibility is due to the fact that Laser Express is a micropodule that is compatible with the HCCS Ultimate Expansion System. MultiPodule adapters for MicroPodules cards are available for 'full-size' Acorn machines like the A300/400/540 and A5000, as well as the compact A3000/4000 ranges.



Canon LBP4 Lite can now be driven by HCCS' micropodule



HCCS' card works with any Acorn

The normal price for a Laser Express card is £249+VAT. An Ultimate starter pack which includes the MultiPodule adapter is priced at £269+VAT. For the show you will be able to purchase a starter pack for just £199+VAT, and this includes a Canon video interface worth £30.

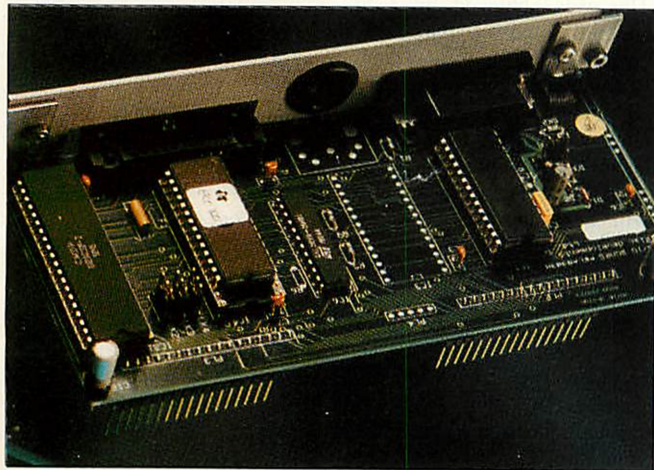
The offer is strictly for show visitors. For more details contact HCCS on 091-487 0760. The Canon LPB4 Lite printer is available from several Acorn dealers.

NET PRICES ANNOUNCED

RISC Developments has announced more details of its new networking cards.

The combined User Port, Analogue and Econet A3000/4000 minipodule costs £79.95+VAT. A boot Rom can be fitted to enable the card to boot from an AUN (Acorn Universal Network). The card is also available without the Econet interface for £44.95+VAT. The full-size podule (A300/400/540/5000) as well as the A3000/4000 minipodule versions of the new Ethernet cards will cost £139+VAT.

Alternatively an internal A4000/3020 network card, which doesn't take up a minipodule slot, costs £159+VAT. Risc Developments is on (0727) 840303.


Risc Developments' net cards work with any kind of set up

THE STATE OF COLOUR

AN upgrade to State machine's G8 Plus colour card allow it to be Replay-compatible, with full animation in true 16 bits per pixel 32K colour.

A *TrueView* application is supplied to display 24 bits per pixel colour clear files. *TrueView* also lets the user pan and scale images larger than the screen area. Along with *TrueView* also comes *ARMovie*, licensed from Acorn.

State Machine say that the card is the only solution offering 25 frames per second animation in true colour on the Arc. There is even a 50 frames per second option at a resolution of 384×288 pixels which offers flicker-free viewing. The upgrade cost is a £30+VAT option to new customers, while existing G8 users can upgrade for £20+VAT.

For more details, contact State Machine on (0582) 483377.

IN BRIEF

● Ayrshire-based software house *Micro-Aid* has released the latest version of its *Payroll* application just in time for the new tax year. *Payroll* is available for both eight-bit BBC micros and Risc OS machines.

The program can now handle the latest 'K' code specifications, in line with latest government legislation. Pre-printed payslip stationery produced by *Micro-Aid* is an option.

Payroll remains priced at £59.95 including VAT and there is an annual registration fee of £34. *Micro-Aid* can be contacted on (0465) 82288.

● John Reed, the editor of the amateur *Illusions* disc-based magazine for Archimedes users has contacted *Acorn User* with details of a new address and lower prices for the *Illusions* compilation discs, down from £6.95 to £4.95.

The second *Illusions* compilation disc is now available and contains around 40 articles from the first five issues of *Illusions*, plus some extras. John has also asked *Acorn User* readers not to phone the number that was published in our March issue. Instead, John can be contacted at 20 College Road, Wembley, Middlesex HA9 8RL.

● With the interest in Arm Risc chip technology currently soaring, what better time to publish a definitive guide to programming the Arm chip?

This is precisely what Alex van Someren and Carol Atack have done. The book even has the seal of approval from Arm Ltd, who advised the two authors during the book's creation.

The Arm Risc Chip – A Programmer's Guide, is an up to date reference work on how to program the Arm processor, and all the latest variants of the chip including the Arm250 and the very latest in the Arm6-series are covered. Co-author Alex is already well-known to many Acorn User readers via his products: the Aleph One Arm3 upgrades and Archimedes PC cards. The book will be published by Addison-Wesley in May, and has a provisional price of £24.95. The ISBN number is 0201 624 10-9. Addison-Wesley can be contacted on (0734) 794000.

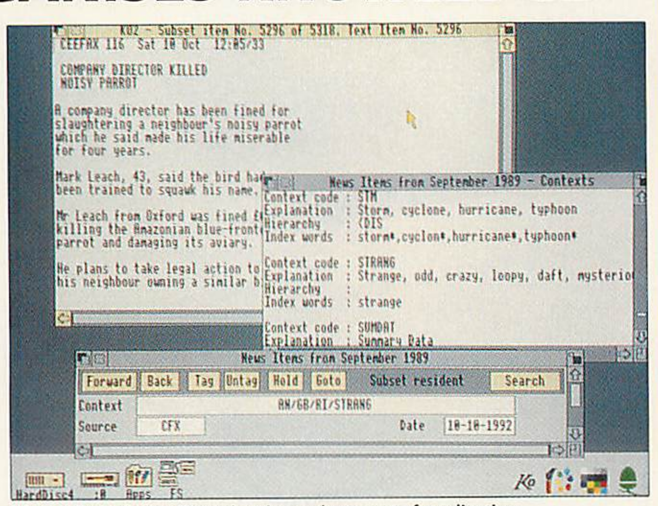
CLARES ORGANISES KNOWLEDGE

WITH a whole catalogue of new releases, Clares Micro Supplies looks set to be one of the central attractions at the *Acorn User* Spring Show in Harrogate. After the recent release of the 16-track *Serenade* sequencer as well as *Rhythm-Bed* V1.27, Clares is now putting the the final touches to *Knowledge Organiser 2* and *Topographer*, with a selection of packages including *ProArtisan 2*, *NightSky*, *Rhapsody 3*, *Plot* and *Schema 2* to follow soon.

Knowledge Organiser 2 is a completely revised version of Clares' innovative textual information tracking application. Unlike its predecessor, *KO2* is fully Risc OS compliant. Information can be in a variety of formats, from Ascii text to viewdata, and can be searched in database fashion and arranged logically.

Also featured is data sharing and hypothesis testing. *Knowledge Organiser* is a fairly unique kind of application, so Clares has provided demonstration version for the uninitiated. *KO2* is priced £99.95 including VAT.

Now promised for release in the summer, the long-awaited Clares' *Schema 2* spreadsheet will have the following new features: upwards compatibility with Acorn's *Advance* integrated spreadsheet application, economical use of memory and better performance, better spreadsheet publishing features and graphs hotlinked to spreadsheet data. It will be usable on 1Mb machines and the proposed price is £135.



Clares' Knowledge Organiser is a unique sort of application

Plot is scheduled to be released on May 1st priced £79.95. The program is a comprehensive charting application which features cartesian, cylindrical and spherical coordinates. A wide selection of 2D and 3D plotting options are available.

Clares' *Rhapsody 3* music notation package is described as a major enhancement over *Rhapsody 2*, though the latter will continue as a low-cost alternative alongside the newcomer.

Added goodies in *Rhapsody 3* include guitar chords, a quick edit panel, a wider range of note styles, automatic bar checking and instrument names. *Rhapsody 3* has a proposed price of £99.95. For more details, contact Clares Micro Supplies on (0606) 48511 or see them at the show.

MAKE THAT A DATE

SHIELING Technology has come up with one of those ideas which makes people wonder why *they* hadn't thought of it in the first place. This one is a mouse mat with a calendar on it. The mat in question covers two years and has a high-durability but non-slip PVC surface. The mat is colour coded beige to match most desktop computers. At £7.95 including VAT and postage it isn't exactly cheap, but it's certainly a novel idea. For more information, contact Shieling Technology on (0252) 519224.



Shieling's mouse mat: an idea whose time has come?

NEW SPEED PC CARD

ALEPH One has managed to improve the communication performance between its range of PC cards and a host Archimedes by around 50 percent. This was achieved by redesigning some of the card's custom chips.

The benefits are mainly better graphics performance, an area in which the PC card had been least impressive. New Aleph One PC Card supplies will have the new chips as standard but unfortunately the upgrade for older cards is not a DIY job.

Instead, existing customers can opt for a special upgrade service. The £25+VAT deal includes the chip swap and courier collection and return of your card. Contact Aleph One on (0223) 811679.

IN BRIEF

● A combined audio/motion video capture and still-frame video digitiser card is being developed by Brain Software.

The card can sample sound to a resolution of 13 bits. The real time video capture function stores digitised video in a non-compressed format which can then be compressed into an Acorn Replay compatible file format.

In addition, the card can be used as a high-quality video digitiser with hardware dithering. An early prototype of an A3000 minipodule was shown at the Bett Show in January and a full-size podule version will also be produced. It's not yet certain who will market the new cards, though the prototype was spotted on the Technomatic stand at Bett.

● Micro Laser Designs in Bristol is now offering a high quality colour laser printing service to Archimedes users. Prints can be up to A3 in size and images can be supplied in *Impression 2*, *ArtWorks*, *Draw* or *Paint* sprite formats. The firm also does imagesetting to film, bromide or Plazar Plate. Micro Laser Designs is on (0761) 453308

● Cambridge International Software (Amsterdam) has announced it is to be the sole distributor for Acorn software and upgrades in Holland. CIS Amsterdam will complement ECD Computers Delft, which has been Acorn's long-running official agent in Holland.

CIS Amsterdam has just released its new disc sector backup utility *BackMan*, soon to be available in the UK for £9.95. CIS Amsterdam can be contacted in Holland on (01031) 20 620 6858.

● Intelligent Interfaces Ltd, based in Eastleigh, Hampshire, has taken over the marketing and support for what used to be release 2 of Acorn's Fortran 77 compiler package.

The company is well known for its Fortran-based Gino graphics libraries for the Archimedes. One of their first tasks, they say, is to completely revise the manual. II's Fortran 77 package is priced £99+VAT. Intelligent Interfaces is on (0703) 261514.

REVELATION ImagePro



"Revelation ImagePro contains just about every feature that you could imagine to aid in the preparation of pictures and enhancement of existing images."

"At an amateur or professional level, ImagePro suits the needs of both."

Peter Clements, Archimedes World



"If you want this kind of package, then ImagePro is the one to buy... It's a superbly professional application."

Richard Hallas, RISC User

STATE OF THE ART PAINT AND IMAGE PROCESSING





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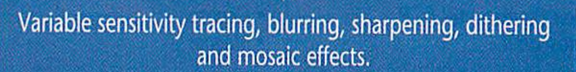
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✦

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✦



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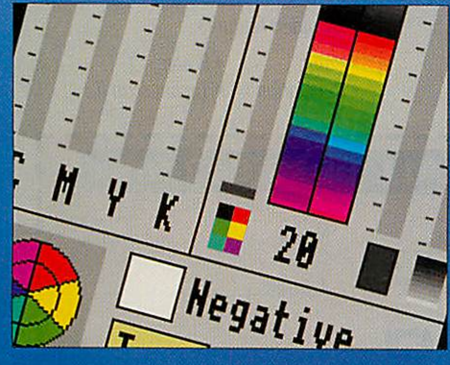
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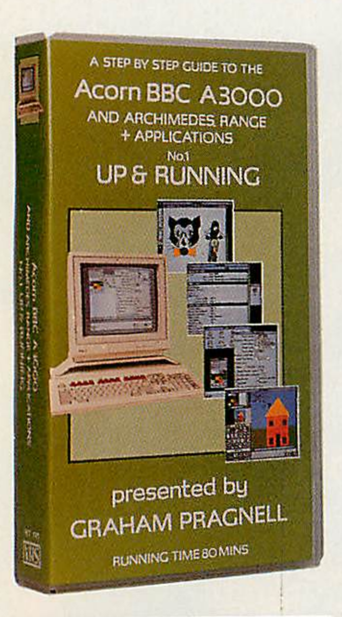
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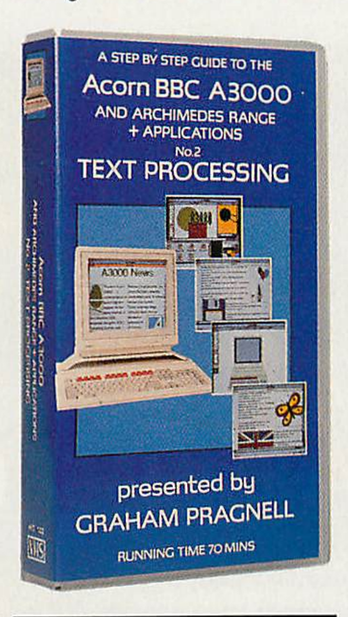
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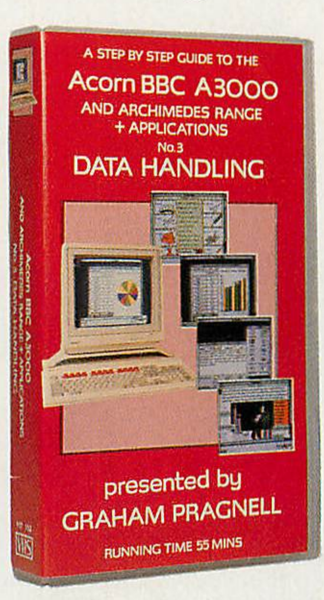
BBC ACORN USER

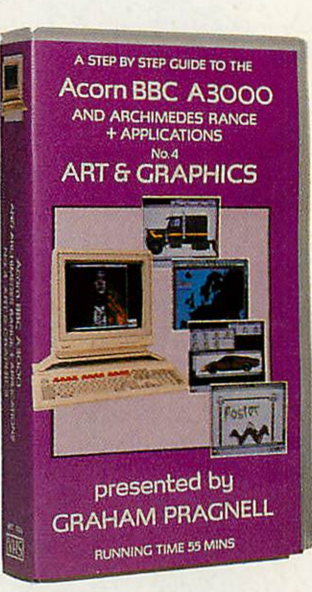
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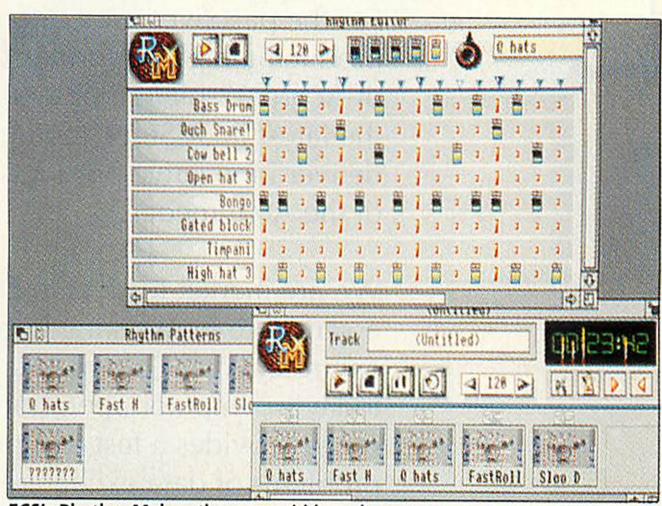
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ECS RECOMPOSES MIDI PACKAGE

EXPRESS Software Projects in Nottingham has released a new version of its *Compose World* Midi package with faster graphics, better icons and the more Midi instrument sounds. Upgrades are available for £5 to existing users who return their original disc. *Compose World* is priced at £48+VAT.

ESP has also announced *Rhythm Maker*, a grid-based pattern sequencer for Midi. It is compatible with both internal Archimedes sounds and external Midi instruments. *Rhythm Maker* costs £34+VAT. ESP can be contacted on (0602) 295019.



ECS's Rhythm Maker: the new grid-based sequencer

SPEEDING UP THE ARM

THE A3010, A3020 and A4000 can now run up to 40 percent faster, courtesy of a Turbo Ram enhancement from Simtec Electronics. This means smoother desktop operations and faster redrawing and printing, and should allow Replay movies to be played back at full speed in mode 28.

Rather than replace the standard Arm chip with a faster Arm3, Simtec's solution leaves the original Arm250 *in situ* and replaces the Ram with a faster type of memory chip, enabling the processor to be driven faster. Simtec says the performance jumps from 7 mips (million instructions per second) to 10mips. A 25Mhz Arm3 produces almost 13mips.

As a motherboard modification accompanies the plug-in Ram upgrade, the whole computer must be sent in for the work to be carried out. The upgrade cost is £129 and fitting costs £15 plus carriage. Call Simtec for more details.

● Simtec has reduced the price of its Arm3 upgrade which features a socket for the soon-to-be released Arm FPA10 floating point accelerator. The new price is £165+VAT. Contact Simtec on (0772) 812863.

MORE CREEPY CRAWLIES

CUMANA has announced two more CD-Rom software bundles. The first pack consists of four CD-Roms; *Dictionary of the Living World, Creepy Crawlies, Image Warehouse* and *Grooves.*

Creepy Crawlies takes the user on a voyage of discovery through the world of bugs, beetles and spiders, etc. *Grooves* contains 90 tracks of royalty-free music ranging from classical to modern jazz.

Image Warehouse is a library of hundreds of full illustrations, smaller clip art pictures and scanned photographs suitable for all sorts of applications from decorating your desktop to brightening up a DTP document.



The price is £299+VAT each, but education customers can have a £50 discount.

The second pack is a subset of the first and £50 cheaper because it doesn't include *Dictionary of the Living World.* Cumana can be contacted on 081-547 3418.

SHARP DEAL

SHARP, has been signed up as the third manufacturer of Arm chips. The deal gives Sharp the right to produce and market Arm chips like Risc, and video processor chips.

Arm Ltd's managing director, Robin Saxby, said: 'We are very pleased to make this announcement since it extends the technologies associated with Arm architecture.' Saxby added that his company's goal of licensing Arm technology in the three key areas, the USA, Europe and Japan, had now been realised.

Sharp's executive drector, Hiroshi Inoue, said: 'The licensed Arm products allows Sharp to open up the 32-bit microprocessor market. By using an Arm product as a core part, system-on-chip devices from Sharp will be enhanced to make many kinds of small-sized, yet high-performance, products become reality.'

This is probably a hint at Sharp's plans to build its own range of personal digital assistants or PDAs, the pocket sized computers that use artificial intelligence and handwriting recognition.

Sharp has already secured a deal with Apple to manufacture the Newton PDA, which is also Arm-based.

The other manufacturesrs that are already involved in Arm production are VLSI Technology in the USA and GEC Plessey Semiconductors in the UK.

IN BRIEF

● The Arm Club user group now has a Freepost address. If you would like further information about Arm Club activities, they can be contacted at The Arm Club, FREEPOST (ND6573), London, N12 0BR.

● Dudley College is celebrating the installation of a new, larger and more reliable hard disc system on its educational viewdata online host system by making its entire library of *Ample* music files available for anyone to download. *Ample* music files work with the Hybrid Technology music synthesizer system which has been running on eight-bit BBC micros for many years now.

The Hybrid Music System, which is very popular in schools, uses a sophisticated multitasking operating system and is capable of producing some very interesting music. If you'd like to download *Ample* files from the Dudley viewdata system you will need Prestel viewdata terminal emulation and a modem capable of logging on at 1200/75 baud.

The modem numbers to call are (0384) 239944 or (0384) 238073, 24 hours a day. A regularly updated catalogue of what's available online can be downloaded as a text file.

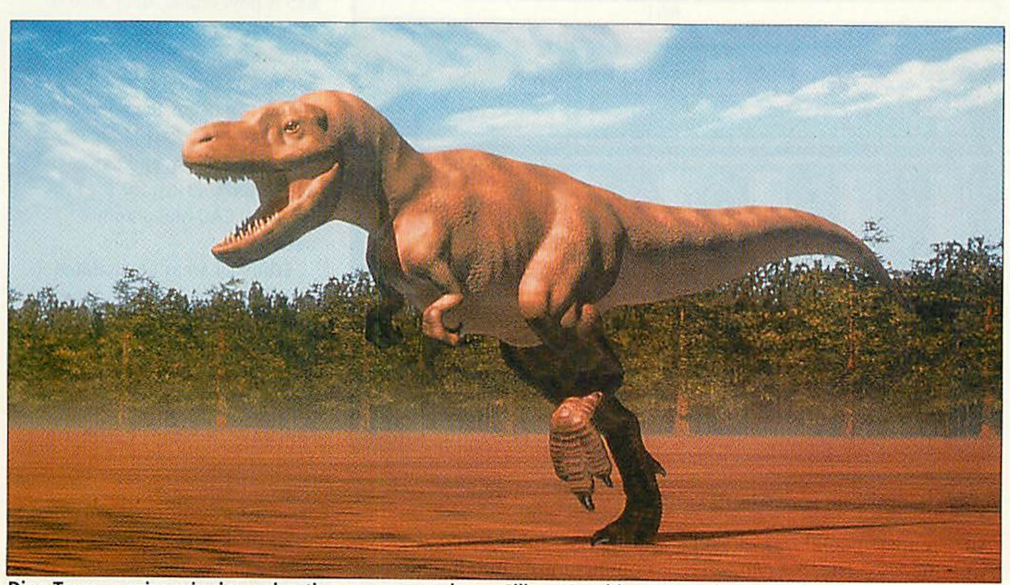
● Widget Software, not to be confused with the similar-sounding education specialists in Leamington Spa, Widgit Software, has released its *Games Pack 3* for the Psion Series 3 pocket computer. Widget confirms that all its Psion Series 3 software titles are compatible with the Acorn PocketBook, which is based closely on the Psion machine.

Widget says *Games Pack 3* is the first commercially available compendium of games for the Series 3 and Pocket Book. Five games are included in the £49 cartridge compendium: Poker; Solo (a version of Solitaire); Reversi; Bandit (for fruit machine freaks) and Quad, which is described as a logic challenge game which involves fitting shapes together.

More established Widget titles include a well-reviewed personal finance application (£69.95) and *Chess* for the Series 3/Pocket Book (£49.95). Widget can be contacted on (0438) 815444.



IMAGINA SHOW RUNS NEW RISCS



Dino Tours, a prize winning animation, was created on a Silicon Graphics system driven by Risc processors

IN ITS idyllic setting overlooking the Côte d'Azur, the 12th Monte Carlo Forum on New Images, Imagina, once again left its audience in a state of awe. One aspect this year was the overwhelming presence of Risc technology, in areas ranging from art and animation to virtual reality, simulators and medical research.

This year, the Imagina Forum included graphics workshops. With £150,000 worth of graphics workstation, we were shown how to create and animate scenes, using methods that are more commonly associated with cinematography and sculpture.

Such machines, whose manufacture has been monopolised by Silicon Graphics, typically use 64-bit Risc processors and are clocked at anything up to 150Mhz.

Silicon Graphics' flagship, the Reality Engine, allows the user to modify and fly around their three-dimensional creations; all rendered in real time. These muscular number-crunchers, plus some remarkable software, are often used in movie special effects such as Arnie's metallic counterpart in *Terminator 2*. The forthcoming *Aladdin* from Disney was just one of many big-names appearing at Imagina's Pixel prize awards.

For lower-end consumers, owning hardware that photographically renders a scene in a fraction of a second may seem far-fetched. Yet it may not be so very far away.

Jack Kreindler

TAKE YOUR BEST SHOTS

ACORN has now licensed the software to allow Acorn 32-bit micros to read Kodak Photo-CDs. But what will this mean for the average user?

The Photo-CD is the result of Kodak's development of a system that would provide a universal format for 'interactive publishing'. It's relatively cheap while being of a high enough quality for professional work.

Photo-CD is the storage of near-photographic quality images on a compact disc medium. Pictures are transferred from normal 35mm film onto a Photo-CD and 100 pictures can be held on a single disc. You can also start off by transferring a single roll of film – say 24 frames – on to a disc, and then take the disc back to the transfer facility for 'filling up' at a later date.

Each picture is stored on the CD at five different resolutions to offer maximum flexibility. These range from 128×192 up to 2048×3072. A professional format allows pictures from 5×4 sheet film to be stored at full resolution.

At present, standard Acorn hardware is unable to display the high-quality images from PhotoCDs. Installing Computer Concepts' Colour Card, or an upgraded State Machine G8+ card, will allow users to view pictures in full 15-bit colour glory. Other cards are expected from third-party developers. For more details see our preview on page 63.

SIDE SHOW

COMPUTER Concepts' collaboration with Wild Vision has resulted in a new application to accompany Wild Vision's Chroma range of genlock/overlay cards. *SideShow* will be shipped with all Chroma cards in future.

SideShow allows existing graphics and text to be overlayed onto a standard video signal. Uses include captioning and subtitles for videos and presentations. Further details can be obtained from Wild Vision on 091-519 1455.

● There are only a few days left till the closing date of Computer Concepts' *ArtWorks* competition. All entries must be in on, or before, 30 April. Further details can be obtained from CC on (0442) 63933.

IN BRIEF

● SPEX, the soon to be released 3D environment designer from ExpLAN, has undergone a number of changes and the price has been altered slightly to take this into account.

The secondary school version will now retail at £99+VAT and the primary school version at £59+VAT. A number of refinements, as well as additions, have been made to the software. Both packages will now include extra resource material in the form of work sheets and discs of clip art. As with the previous version, site licences are included as standard. Further details on SPEX can be obtained from ExpLAN UK on (0822) 613868.

● PROARTISAN, the 256-colour painting package from Clares, is to get a major revision. Back in the early days of the Archimedes, *ProArtisan* started life as *Artisan*; the first ever art program written for an Acorn 32-bit machine.

Unlike the original *ProArtisan*, *ProArtisan2* is completely Risc OS compliant and runs entirely from within the desktop environment. As well as a complete revamping of the front-end, *ProArtisan 2* includes a wide selection of improved tools. Textures, Blends and Draw file importing are just a few of the new tools that have been added.

Image processing is now a major feature, making *ProArtisan 2* ideal for modifying scanned and digitised images.

Even in its unfinished form, *ProArtisan 2* looks like it could be the art package to which all others are compared. The proposed release date is late Spring 1993. For more details see our preview on page 59 or call Clares on (0606) 61348511.

● You can contact us with any news, views or comments by writing to The Graphics Page, Acorn User, 101 Bayham Street, London NW1 0AG, or by modem via Arcade BBS user #1144. Arcade is on 081-654 2212 or 081-655 4412.

If using Arcade, please stick to messages only. Any large files, such as pictures, should be sent on disc to Acorn User.

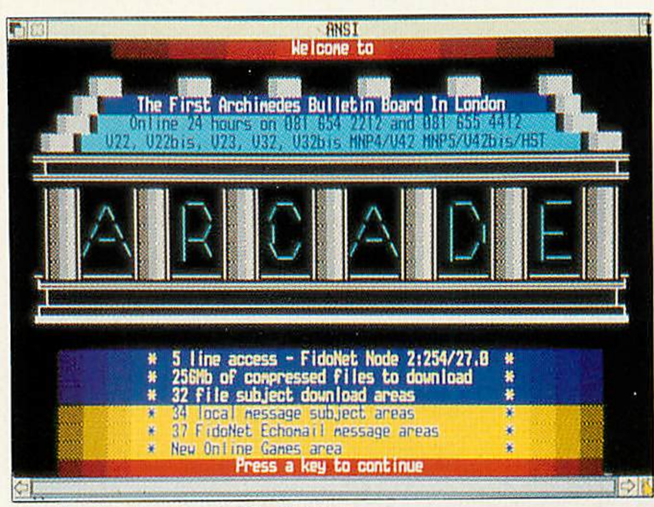
Rob Miller



ARCADE EXPANDS ITS INTERESTS

ARCADE BBS and its hard drives have been whirring away busily for nearly three years, building a dedicated following of users who regularly meet in person to put faces to usernames and talk about Archimedes' and the meaning of life over a pint or two. Such is the calibre of Arcade's regular users that when its main hard disc drive failed catastrophically a year ago, they generously responded with a spontaneous electronic whip-round. This resulted in Arcade receiving enough voluntary donations to replace the old drive with an even larger one and obtain and install a tape-streamer backup system to archive the whole BBS resource nightly.

Arcade has been instrumental in getting several new BBSs off the ground by offering advice and assistance in the complex setting-up process of *ARCbbs* and *ARC-Binkley* software. Atomwide – a well-known local company – has recently sponsored installation of an additional fifth line in appreciation of the friendly atmosphere of the BBS and freely-given time and effort by the operators. Here I should declare my interest as part-time joint Sysop and software applications developer.



Arcade is loyally supported by its users

An experimental FidoNet Archimedes file, *Echo*, is being tested at Arcade. This is a system where, like Echomail message distribution, program and/or text files can be sent out around the Fido network during night-time polling.

Arcade, acting as a link in the chain of BBSs, receives a file, retains a copy and passes them on to BBSs in the scheme that have not already received them.

By popular request, Arcade has just launched two new Archimedes-interest FidoNet message echoes; one covering Archimedes games and gaming, the other expanding the formerly local *Acorn User* comment area into a nationally distributable message echo. These are private but, if they become sufficiently active, could qualify for national 'Backbone' distribution.

Now *Acorn User* readers can express opinions on the magazine content, exchange ideas about published programs, and make use of the wide knowledge-base of FidoNet Archimedes users. SysOps interested in these message echoes should contact David Coleman at Arcade BBS by netmailing Fido node 2:254/27.0 or calling the BBS number at the foot of the page.

TO BABT OR NOT TO BABT?

A NUMBER of readers have enquired about the '£99 Hayes pocket modem' mentioned in the *Chatter* review, (*Acorn User* March 1993).

There are modems available in the UK at this price level, but BABT approval cannot be expected and actual use of any modem that is not approved by the BABT is illegal. However, the modem that we referred to was a ViVa 2400 Pocket. This is a battery powered product that can be purchased in the US for $89, considerably less than £99!

In the UK the DynaLink 9624AP pocket modem is currently being advertised by ShiBro, who can be contacted on 071-224 8320, for £99.95 inc VAT and delivery, and is a V22/V22bis data – but no compression – and 9,600 fax modem. The Dynalink 9624VQP model additionally features V21, V23, V42 and V42bis for £149.95.

These modems will work well with David Pilling's *ArcFax* program using his supplied *EXAR* driver. However, we must stress that, although it's perfectly legal to buy modems without the BABT seal of approval, it is illegal to actually use them in the UK on PSTN circuits.

For a modem round-up, including two pocket-sized models, see page 56

A-LINK FIX

THE RECENTLY available A-Link serial interface includes a replacement Risc OS 3.1 serial device driver module.

Aside from enabling A-Link to work correctly, this has the side-effect of curing most of the problems that have been experienced up to now with higher speed comms on the serial port with Risc OS 3.1.

Presumably Acorn will be making this module available to all users. The current inability of the serial port on older machines upgraded to RISC OS 3.1 to satisfactorily support speeds above 9,600 is particularly irksome with V32bis and higher-speed modems becoming popular and affordable.

NEWS IN BRIEF

● A new system called Raytech BBS is now online, dedicated to computer graphic ray tracing and rendering, and run by SysOp Paul Smith. The Scotland-based board supports most of the popular PC raytracers (*POVRay*, *Vidid*, *Ray-Shade* and so on) and has been appointed UK Host for the Professional CAD and graphics network.

Echomail areas are updated daily from the US on all graphics-related subjects including Auto-CAD, Rayracing, Fractals, Animation and many others. Raytech BBS is on (0862) 88340 at all speeds to 14.4 V32bis/V42bis 8N1.

● Until now, Acorn A4 portable users have been denied the useful Action key shortcuts offered by *Arcterm7*, the popular comms software. The latest 1.44 version allows the use of an alternative left-hand CTRL-SHIFT key combination to access terminal functions, as well as implementing the new block driver serial interface standard.

This allows neater Econet modem server support and opens the way to linking *Arcterm* into other applications as a terminal emulator. *Arcterm7* costs £68 +VAT. For more details, contact The Serial Port on (0749) 670058.

● Connections BBS, a Viewdata system running on a BBC Master, is now back online with a new SysOp and a new phone number. The BBS is now run by Steve Beattie on 081-423 2878 for 24 hours using the ring-back system. Call the number and let it ring a couple of times then hang up. Call again immediately and the BBS will answer this time.

Connections, which was started by Steve Pursey – now SysOp of Arctic BBS running on an Archimedes – will continue to support the BBC family, and expand the original filebase.

● YOU can contact me with any news or information you'd like to be included on the Comms Page by writing to: David Dade, BBC Acorn User, 101 Bayham Street, London NW1 0AG or by modem on Arcade BBS, User #2 – 081 654 2212 or 081 655 4412



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R140		Analogue*
R260		
A540		
A5000		

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Ultimate Expansion System	
MultiPodule (2 slot)	£39.00
A3010	
Hard Drives	
20Mb IDE	£186.38
60Mb IDE	£271.49
Memory Upgrade	
1Mb RAM	£29.79
4Mb RAM	£126.81
Ultimate Expansion System	
Multipodule (IDE + 2 slot)	£41.70
Multipodule+20Mb+PSU	£220.43
PSU+Fan+Buffer Kit	£30.00
20Mb for Multipodule	£169.36
A3020/4000	
Memory Upgrade	
2Mb RAM	£59.00
Expansion	
Econet	£39.00
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NEW PHASES FOR NW SEMERC

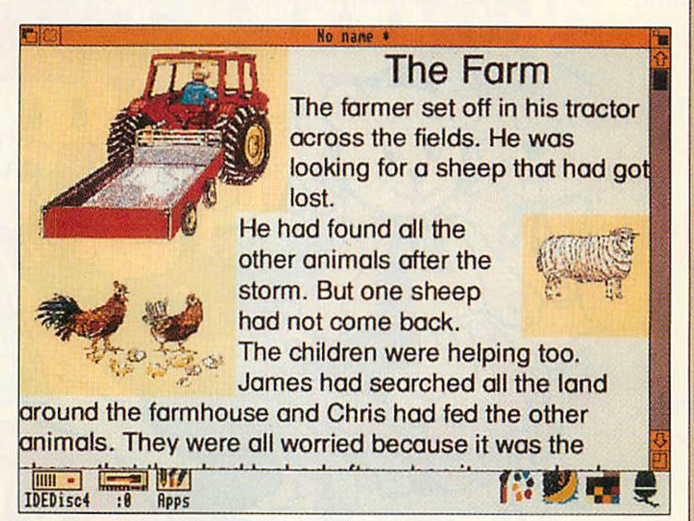
NORTHWEST Semerc has launched *Optima* for the Archimedes. It's a hypermedia database allowing users to link words, pictures and sounds to create multimedia pages.

Sticking to the policy of making software easy to use for special needs children, many of the commands are couched in terms such as 'bigger', 'taller', and 'thinner'. *Optima* is priced at £18.

Also launched recently is an upgrade to the original *Phases* word processing package, *Phases 3*. The new product incorporates the old functions with new ones such as blocking and moving, exporting of text and close procedures. *Phases 3* is fully compatible with *Full Phases*. It is priced at £18, and older versions of *Phases* can be upgraded by applying to Northwest Semerc.

In conjunction with Cumana and Acorn, Northwest Semerc has also launched a complete special needs solution machine. Based around an A4000, it contains a pre-fitted Cumana expandable multi-use interface/user port and a selection of software from many educational suppliers.

At £899, it looks an interesting buy for many primary, as well as special needs, schools. The addition of the interface allows easy use of switches, overlay keyboards and other devices. Northwest Semerc can be contacted on 061-627 4469.



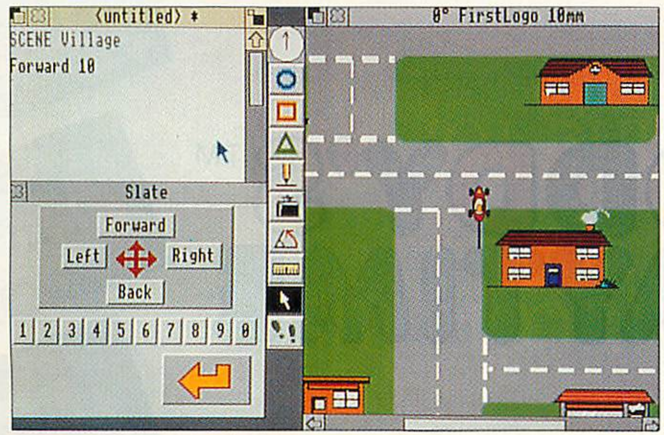
Phases 3 adds new features to a traditional favourite

LOGOTRON'S NEW LOGO

LONGMAN Logotron has launched *FirstLOGO*, a Risc Os compliant, multitasking application for beginners in Logo, the graphics-oriented computer language.

FirstLOGO prints in colour from any suitable printer, using a standard printer driver and the ability to save the graphics created as *Draw* files makes this version an interesting development. Children are able to drag the turtle around the screen and *FirstLOGO* writes the resultant commands. The inclusion of a ruler and protractor tools allowing the measurement of distances and angles is a useful inclusion.

The addition of a new multilingual capability makes the price of £24 for a single user copy and £72 for a primary licence worth an initial investigation. Logotron is offering a 30-day trial period; if you are not happy, the company refund your money. Longman Logotron is on (0223) 425558.



Longman's FirstLOGO makes it easy to get around town

ADMIRING THE VIEW

CLARE'S new application for the geography curriculum is a piece of software, based on standard Ordnance Survey map features, that allows the user to draw a map in two dimensions, choose a spot on their map and view the landscape from there in 3D; it is possible to draw in contour lines, forests, rivers and bridges and stand at the top of the hill and admire the view.

The two pieces of software making up the package can be used together, but anything apart from very small maps requires more than 2Mb of memory to switch from 2D into 3D. Care must be taken when designing maps; rivers can run uphill.

The full price for *Topographer* is £79.95, and a demo disc is available on request. This package is one of many launched recently by Clares (including three music titles and an upgrade to *ProArtisan*). For more details, contact Clares on (0606) 48511.

IN BRIEF

● St Johns Infant School in Hampshire marked the installation of a cross-site Econet network recently with a grand opening ceremony. The school-wide Econet network must be one of the first to be installed in an infant school.

The system uses a menu system (*Waiter* from Digital Services) with children choosing the software they wish to use. Each classroom contains a computer and each class has its own saving area on the server. Speed is rarely a problem since the demands made of the network are less than those of a large secondary school. Further information can be gained from Steve Holroyd at the Hampshire IT Centre on (0705) 378266.

● Icon Technology has now completed the addition of a sound module to its primary word processor, *Startwrite*. This feature means that by using software such as Speech from Superior Software, it is possible to get typed text spoken back. We will be reviewing this in greater detail next month.

● The series of popular games from Triple-R: *10/10 Maths*, *English* and *Early Essentials* now run under Risc OS 3.10 and the company is also working on further titles in modern languages, science and algebra. All titles are offered on a free 14-day trial. For further information, call (0724) 780370.

● If you are a registered user of Logotron's mathematics package, *Numerator*, then ring for your free set of *Numerator* workcards. This set of work cards has been created for use with the software, which models arithmetical functions and creates 'machines' that add, multiply and perform other functions as desired.

Each activity sheet is directly linked to National Curriculum attainment targets. The book was created by Brian Dye of Hewett School in Norwich. Archimedes *Numerator* costs £39.00 and is fully Risc-Os compliant. Logotron is on (0223) 425558.

Clare Johnson is the adviser for Bexley Acorn Education Centre

EDUCATION WAS NEVER THIS MUCH FUN

Noddy's Playtime is a graded creativity and entertainment package for home computers based on solid educational principles for 3-7 year olds.

Drive with Noddy in his car and explore the magic of Toytown, visiting the 8 special learning locations.

- Railway Station - memory game
- N&B Works - observation game
- Chimney House - musical fun
- Noahs Ark - jigsaw puzzle
- Farm Yard - animal matching
- Market Place - letter recognition
- Post Office - counting
- Police Station - maze game

Also included is a junior Art Package which develops your childs creative ability.

- Picture Colouring.
- Electronic 'fuzzy felts'.
- Freehand drawing with pens and spraycans.
- 50 pre defined fill patterns.
- One finger on, one finger off mouse control for tiny hands.

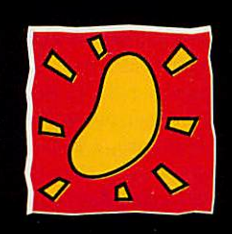
Noddy's Playtime features user friendly icons so that even the youngest family member can learn and have fun.

There is a choice of 3 carefully defined learning levels designed in consultation with teachers. Noddy's Playtime also includes FREE: Toytown map, keyboard overlay and wobbler. A comprehensive manual and parent teacher guide will enable you to bring your childs imagination to life.

RISC OS 2 + 3 compatible

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IBM PC screen shots

JUDGING CHARACTER

Typing is dead, long live optical character recognition, says Mark Moxon

Optical character recognition (OCR) software is proving to be a most lucrative business: one major OCR software publisher estimated that revenues from OCR hardware and software in the PC world would top $100 million this year.

It's not hard to see why; OCR can take paper documents and convert them into computer text which, of course, offers more convenience than any paper-based filing system.

The typical scenario where OCR becomes a godsend is when a filing cabinet stuffed full of paper documents needs to be put on to computer; typing the text in by hand is one option, but OCR is both quicker and cheaper than hiring a typist. All you need in order to set up your own OCR system is a hand-held mono scanner and suitable software.

NEW PACKAGE

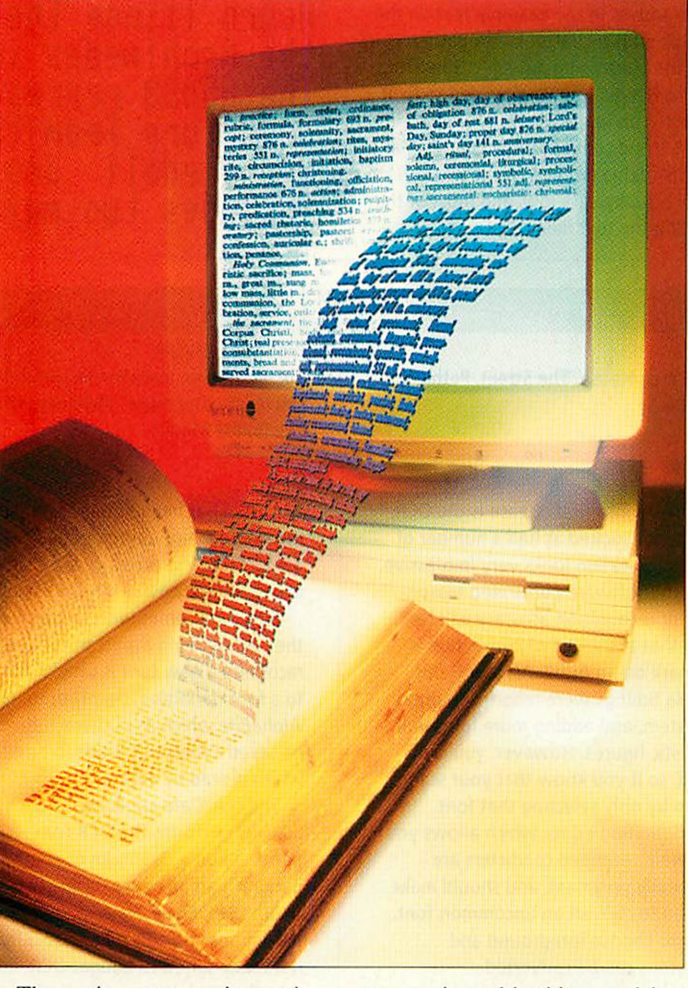
OCR packages have been available for PCs for some time but, until recently, OCR packages for the Archimedes were thin on the ground. Irlam's *EluciData*, released nearly two years ago, was the first stab at this market, but it failed to live up to people's expectations.

However, all that is about to change. There are now three contenders on the OCR scene: Risc Developments is set to release its package within the next few months. Meanwhile, Irlam is updating *EluciData* and a brand new company are about to release *Optical*.

OCR, the working title for Risc Developments' product, is now very near completion, and we tested out a pre-release version.

INTO ACTION

Working with *OCR* is simplicity itself. To process a page, scan it in and drop the resulting sprite on to *OCR*'s icon.



The sprite pops up in a window: from here you can zoom in on the scan, rotate it or invert it as you wish. The next step is to create a zone on the page, by marking a rectangular area of the sprite to be processed.

By using zones in this way, *OCR* allows you to control how the page will be deciphered, thus avoiding potential problems such as multiple columns of text and pictures within the text. The zone can be resized in exactly the same way as frames in DTP packages, with eight ears arranged round the edges.

Now for the clever stuff. Start the OCR process, and a window pops up in which the text appears. The scanning process is multitasking, and it doesn't make the machine too slow to use. When finished, the text can be saved as a standard text file and that's all there is to it.

IN PRACTICE

To test *OCR*, I scanned in the first two pages of *Acorn User*'s review of the A5000 from December 1991, using Risc Developments' own Scavenger hand-held scanner set to 400dpi.

The results were good: out of 6,233 characters scanned, there were only 84 errors, giving a character accuracy rating of 98.7 percent. A quick way of assessing and comparing accuracy ratings is to take 90 from the percentage to give a new rating. Thus *OCR* scores a respectable 8.7 points.

The speed of conversion is also impressive; the average rate of conversion for the *Acorn User* example was around 1,200 characters per minute on an Arm3 machine, which equates to around 220 words per minute. A decent typing speed is considered to be around 40 words per minute, so the *OCR* software wins hands down.

Risc Developments claims that speeds of up to 540 words per minute can be achieved, but this assumes a very clear scan at a lower resolution of 200dpi, and the accuracy does drop off to nearer 95 percent.

On average, Risc Developments aims for 30 words per minute, including scanning, adjusting the contrast, performing the OCR and then editing the text file for mistakes.

OCR software is, by its very nature, complicated. There are many methods for recognising characters from scans, but the latest buzz word in OCR technology is 'omnifont'. This approach works in the same way as the human brain: the software remembers characteristics about letter shapes, and when it sees a letter, it pulls it apart to see if it can work out the letter from its shape.

The advantage of omnifont technology is that, in theory, it can recognise almost any font. Risc Developments' *OCR* does not use omnifont technology – only PC packages costing well over £500 do – but it has a pretty sophisticated algorithm, enabling it to perform well with a large range of fonts.

The package, when sold, will be programmed to recognise at least the following list of fonts: Trinity, Garamond, Paladin, Bookmark, New Century Schoolbook, Homerton, Vogue and Corpus. However, because of the way the software has been written, it

PETER DAZELEY & GEORGE SNOW

POSSIBLE PROBLEMS

OCR is not a perfect science: there is no package in existence which can get everything right all the time. However, there are some errors that are quite common in OCR conversion, and they are interesting in that they demonstrate the methods used.

A problem we had with the scan of December's issue was with the lower case 's': the printing was quite faint, and the top and bottom of the character had disappeared in the scanning process.

Because of this, the match with the letter 's ' in the shortlist was not good, so *OCR* tried splitting the 's' into two parts. These two parts were matched to the characters ! and i, as shown in the example text on the right, with a better fit than the match with the letter s. Altogether 17 of the 348 lower case 's' characters in the piece came out as !i. However, knowing this, a simple global replace was all that was needed to fix it.

Other errors on a similar tack were with lower case 'b's, which sometimes came out as lower case 'L's and commas if the character in the scan was disjointed, and a few 'n's came out as 'r's and 'i's. However, the number of errors was actually very low, and most of the above were easy to spot when editing the text file.

```
the A5000. Judging by the
buzz of excitement among
visitors (especially those who
were queueing to buy one) the
new machine is undoubtedly
the biggest leap forward for
Acorn !iince the introduction of
the Archimedes in 1987.
The A5000 represents a
departure from the original
Archimedeli  design  and
includes two major improve-
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THE COMPETITION

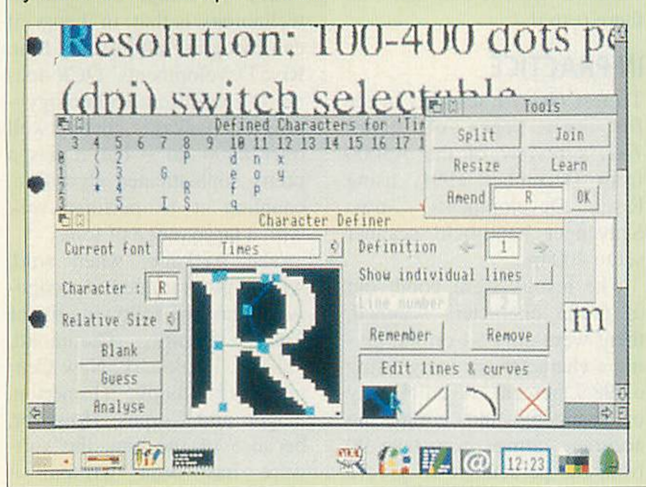
Product: Optical
Supplier: Neurotron Software, Birch Tree House, The Street, Petham, Canterbury, Kent CT4 5QU
Tel: (0227) 700516
Price: £59

Neurotron is a new software company whose first release is the OCR package *Optical*. The pre-release copy we looked at had a number of features missing, but the projected specification looks very impressive.

In the early version that we saw, the software performed reasonably well. Neurotron says its character recognition accuracy will be better than 90 percent, and reckons that the speed of conversion is around the 240 words per minute mark on an Arm2. Although this sounds much quicker than *OCR*, these timings were taken with only one font definition built into the system, and adding more fonts will slow the system down to more realistic figures. However, you can select which fonts are to be checked, so if you know that your scan is in one font only, you can speed it up by only selecting that font.

Optical also includes a character definition editor which allows you to edit the font definitions against which scanned characters are matched. This part of the system is really very neat, and should make the package quite flexible if you need to convert an uncommon font. Another useful feature is the ability to choose foreground and background colours, so that colour scans can be converted.

There are a number of features that Neurotron hopes to add, including an intelligent spellchecker and a multitasking option for the conversion, but they hadn't been implemented in the pre-release version. *Optical* looks to be a good application, though it's too early yet to comment on its performance.

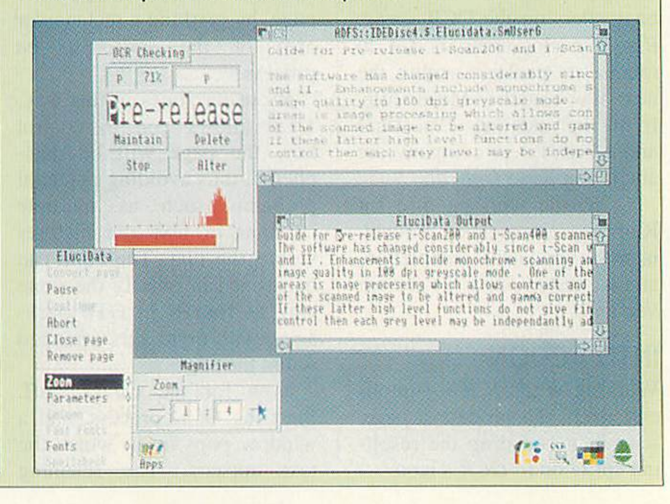


Product: Elucidata
Supplier: Irlam Instruments, Brunel Institute for Bioengineering, Brunel University, Uxbridge, Middlesex UB8 3PH
Tel: (0895) 811401
Price: £159

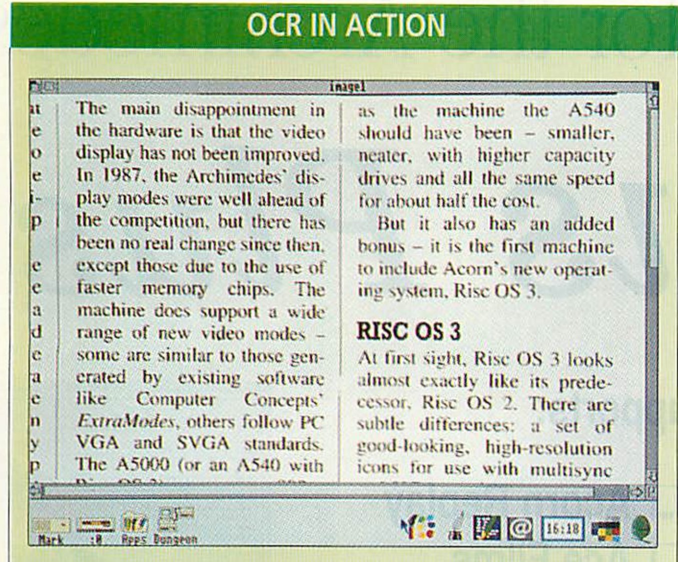
EluciData has been around for nearly two years, and is now going through a major upgrade, which will be sent free to all registered owners. Early versions of the package were not as effective as people expected, but now it is more reliable and flexible.

EluciData comes with an application called *AlphaBite* which provides the font learning aspect of the package. Teaching the software to recognise a new font is simple, though a little laborious: to add a letter to a font definition, simply drag a box over a scan of the letter, and tell *AlphaBite* which Ascii character it represents. Font definition files can be saved away, and reside in an application folder called *!Alphabets*, which is read by *EluciData*.

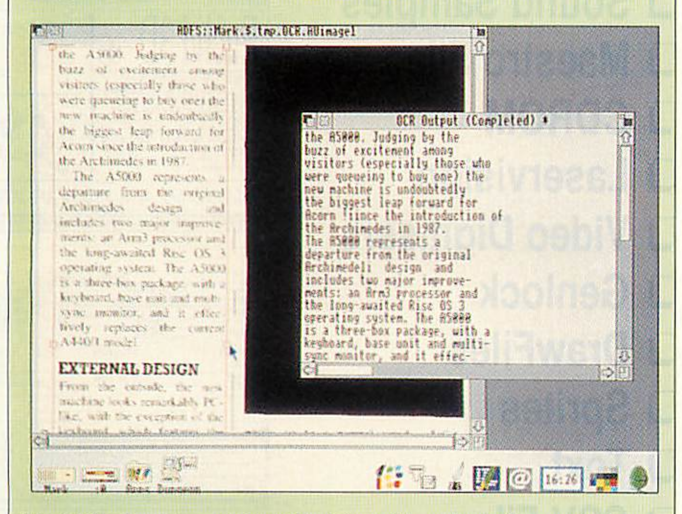
The *EluciData* application forms the heart of the package, and actually performs the OCR conversion. Performance was quite adequate on a clear scan of some monospaced text in Corpus, but the package had immense difficulty with the hand scanned page from *Acorn User*. *EluciData* is mainly aimed at those with high quality flatbed scanners, like those sold by Irlam, and as a result the package is not really suited to budget OCR. Conversion was also quite a lot slower than Risc Developments' offering, though in the released version it will be faster. There are some nice features, such as the handling of possible errors in the scan and, at this stage, *EluciData* seems to be a competent package. However, with the competition selling for about £60, it could prove to be rather overpriced.



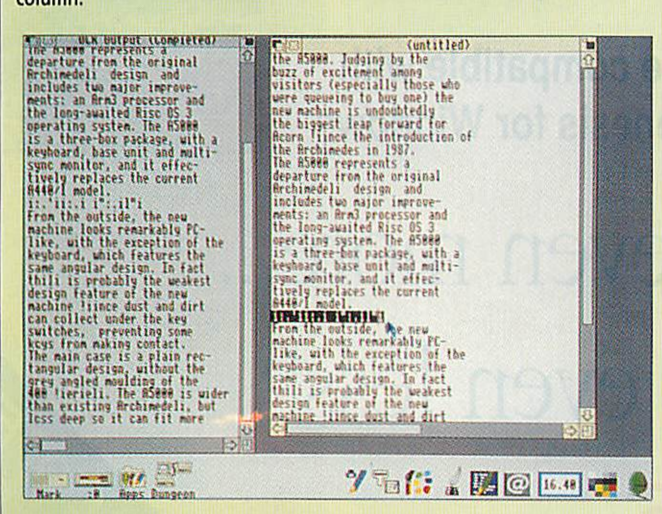
OCR IN ACTION



A portion of the original scan, viewed using *Paint*. This scan was input using a Risc Developments Scavenger hand scanner, and you can see that the scan slopes from left to right: this caused no problems with *OCR*, though.



The *OCR* software goes into action. The red box shows the zone to be converted, and the text appears in the grey window as it is read. Notice how the zone avoids including the vertical lines to the right of the column.



The OCR output goes to *Edit*, for corrective editing. Each column was converted separately and, as the processing was multitasking, one column could be corrected in *Edit* while the next was being processed.

should be able to recognise fonts similar in general design to the above.

One important point is that the package (at the moment) has not been taught bold or italic styles, though future versions should be able to recognise these effects automatically. The problem is that as more fonts are added to the *OCR* database, the system slows down, so a reasonable range of fonts were included.

BEHIND THE SCENES

When a zone is put through the *OCR* mill, the software tries to find gaps between lines by drawing imaginary lines across the image: if a line can be drawn without going through black, then there is a gap between lines.

Of course, with hand scanners the image might be slightly off level, so the lines don't have to be horizontal, or even straight, as long as a feasible line can be drawn. If lines cannot be drawn through a zone, then that zone is classed as graphics, and is ignored. For example, in our test scan, (see the examples on the right) the zones had to avoid the vertical lines in the original article, otherwise the whole text area would be ignored.

Once the software has decided where the gaps between lines are, it takes each line in turn and processes it. A similar approach to that for line detection is used to work out the positions of the individual characters in the line: the line is traversed, and details of the spread of white space in the line are built up, from which the gaps between words can be calculated, as well as the positions and sizes of individual characters.

Each block of the scan which *OCR* thinks is a character is then taken and compared to the font definitions which the package knows about; these definitions are stored as sets of statistics, and the software can decide very quickly whether a match is any good.

When *OCR* has checked through all the font definitions for a match, it builds up a shortlist of the characters which it thinks are the best guesses. If the statistics show that these guesses are not very close, the block is split into two pieces vertically, and each block is matched; this method is especially applicable to ligatures such as 'fi', where the characters can physically join up on the page. If the match for the two blocks is better than the match for one block, then the two matches are used, otherwise it's back to the shortlist for the best match from there.

The choice from the shortlist is also influenced by the context analysis stage, which makes sure that numbers don't appear in words, to prevent lower case 'l's being interpreted as '1's in the middle of words, for example. Finally, the characters are displayed in the output window a line at a time.

EARLY DAYS

It's too early to compare the three packages on equal terms, as they are all at different stages of development. However, at this stage, the Risc Developments package looks the most promising.

Risc Developments hopes to price the package at around £50 to £60 which is literally a tenth of the price of a decent PC package. Admittedly the PC packages have better technology and have whole companies dedicated to their packages, but the results from Risc Developments' package are probably good enough for most users.

Possible enhancements to the package include an application to teach *OCR* new fonts, multiple text zones, an intelligent *OCR*-specific spelling checker, retention of style information, multi-column capabilities, automatic detection of ligatures and a built-in editor, although the first version to be released will be broadly as described above.

If the package sells well, then Risc Developments may consider all sorts of extras: it already has a fast and reliable OCR interpreter, and that's the hardest part to get right.

PRODUCT DETAILS

Product: OCR Software
Supplier: Risc Developments, 117 Hatfield Road, St. Albans, Herts AL1 4JS
Tel: (0727) 840303
Price: £50-60

The *de facto* standard multimedia authoring system for the Archimedes

Genesis Plus

The Genesis family of multimedia authoring systems is the most widely used on the Archimedes, and now produces applications which can also run, without change, under Windows™.

Genesis Plus allows the creation of applications consisting of linked pages of information in a wide variety of formats. Pictures, sounds, animations and text can be added simply by dragging files into frames on your page - just like using a DTP package. Text can also be typed directly into frames and formatted to suit.

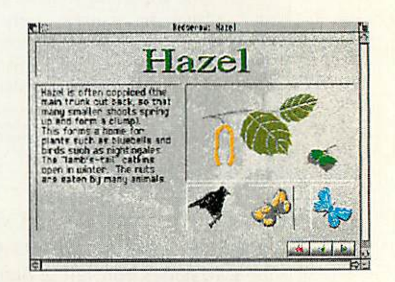
The power of Genesis lies in the fact that every frame can be readily linked to other pages so that information can be organised and cross-referenced very easily. Simply clicking the mouse over a linked frame will then lead to further information about the object in the frame, or might play a sound sample relating to the subject in the frame.

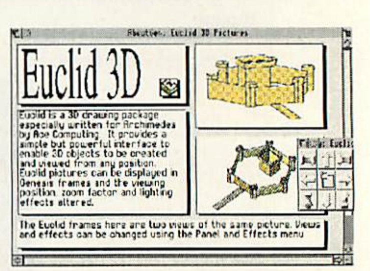
Genesis Plus uses powerful compression algorithms so that data is stored efficiently. It is capable of running well even on 1Mb single floppy disc machines, but has sufficient power to manage even the largest of CDROM based databases.

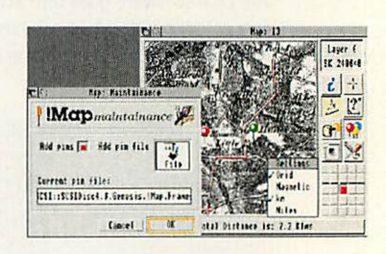
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- ❑ Ace Films
- ❑ Euclid 3D Files
- ❑ Sound Samples
- ❑ Maestro Files
- ❑ CDROM
- ❑ Laservision
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OLD MASTER

Graham Bell examines the latest avatar of Masterfile

Sheridan Williams' BBC micro database manager, *Masterfile*, now fast approaching a decade old, has now been rewritten and released in a new Risc OS version by Risc Developments.

The early signs for *Masterfile* are encouraging, although the package artwork is clearly reminiscent of the Macintosh database, *Filemaker*. The software arrives on a single floppy disc, accompanied by a second disc of example databases and a quick reference card. The manual is commendably slim at 100 pages, and clearly written. *Masterfile* installs without any fuss; Risc Developments has clearly learned from the adverse reaction to early protected versions of *Ovation*.

However, any favourable impressions are quickly destroyed by the process used to define a database structure. *Masterfile 3* uses a similar 'descriptor' concept to its eight-bit antecedents. This has a distinctly old-fashioned feel. It uses a spreadsheet-like display, with each row of entries defining a field in the database. Into the columns, you fill the field name, type, width, any range checks and options.

But to do this, there's no help, not even a menu of possible field types or options. You can quickly define the fields you want from the six types available (fixed-length text, integer, real, date, calculation and picture).

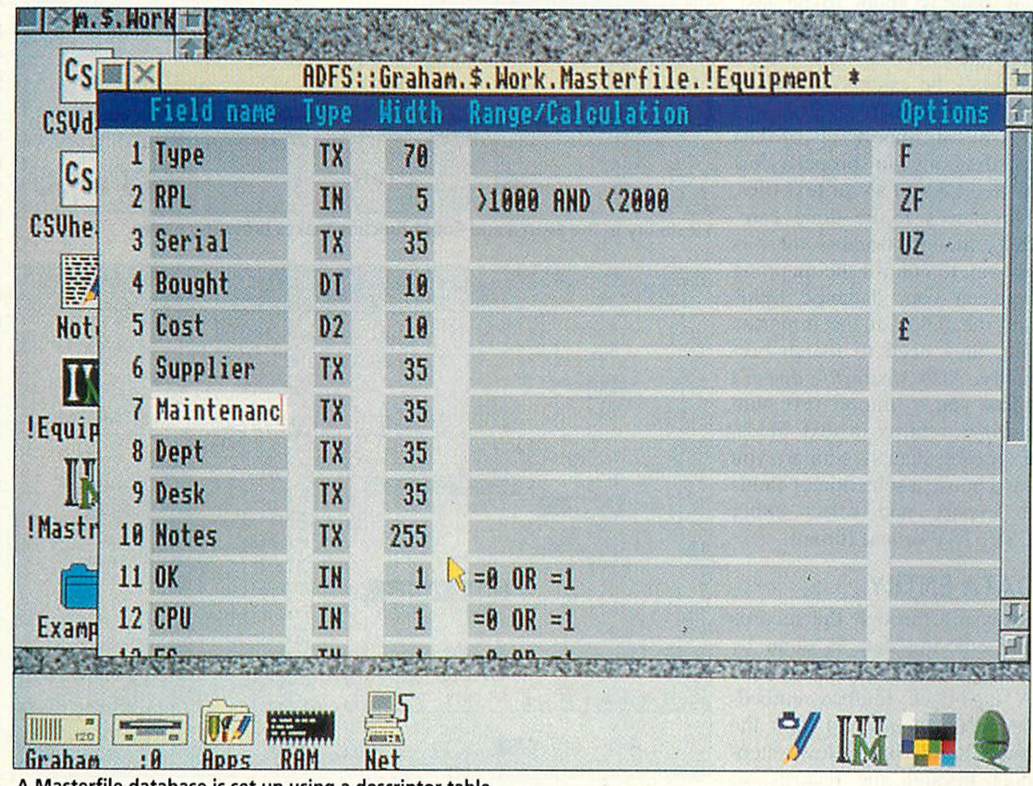
Calculation fields can be used to show the results of calculations applied to other fields, for example adding VAT to prices, or automatically allocating a unique serial number to each record in the database; something that Digital Services' *Squirrel* lacks.

Calculations can be entered into the descriptor table using Basic-like maths and string functions, and the same syntax can be used to define range checks for normal fields; upper and lower limits, or even short lists of valid options such as ="Mr" OR ="Ms" OR ="Dr". This is remarkably flexible and easy to use. But there are a couple of silly restrictions: for example, field names are limited to only ten characters – fewer than the eight-bit *Masterfile* – and there are no ready-made boolean (yes/no) fields, though you could use a single character text field with a range of ="Y" OR ="N". There is no support for arbitrarily long text file fields, nor for the storage of files other than sprites or drawings.

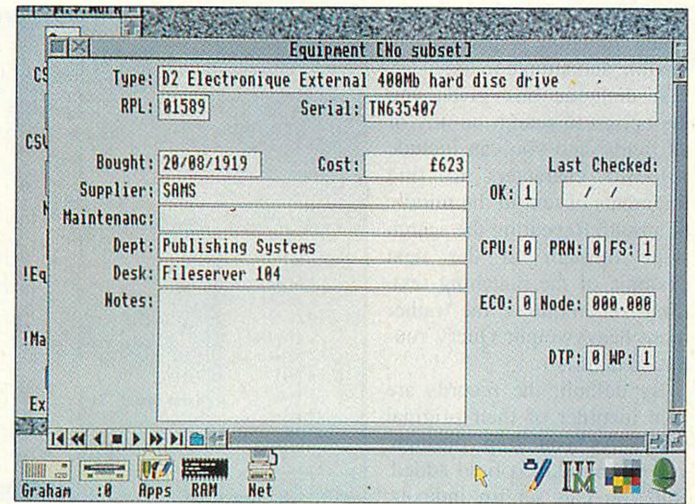
In *Squirrel* or *Datapower*, the process of defining the database structure is integrated with designing the primary card layout, and it is a very slick graphical process. In *Masterfile* the two remain quite separate. Completing the descriptor table and saving it creates the database, stored as a new directory, into which *Masterfile* writes a blank data file, a default card layout and the descriptor itself. It also sets up empty index, report and subset folders.

The layout editor is basic: you can move fields around, change their displayed size, add label text to the card and so on. But there is no way to use outline fonts, nor to change the card colour. You can change the colour of each field, and liven up the presentation by including a drawing or sprite on each card. A grid can be switched on to help position the various elements on the card, but its size cannot be varied.

You can in fact design several different card layouts, which can potentially show different fields: it is possible to hide certain fields, so that, for example, by using one card layout you could type in details of a company's registered address on one card, but



A Masterfile database is set up using a descriptor table

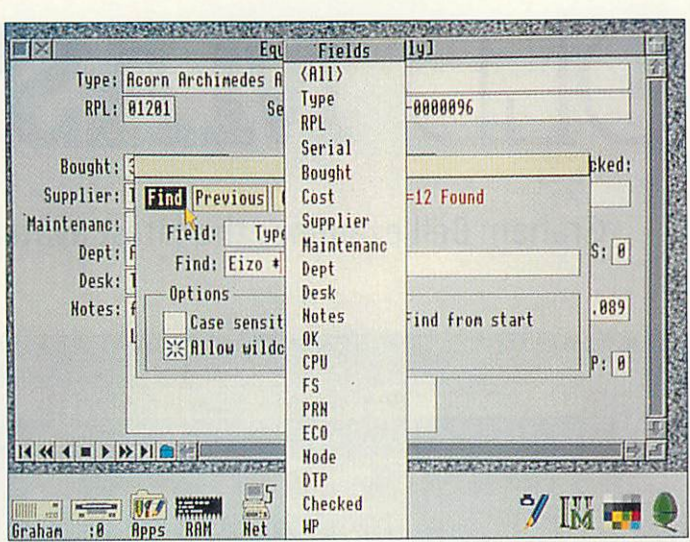


Data entry cards can incorporate graphics

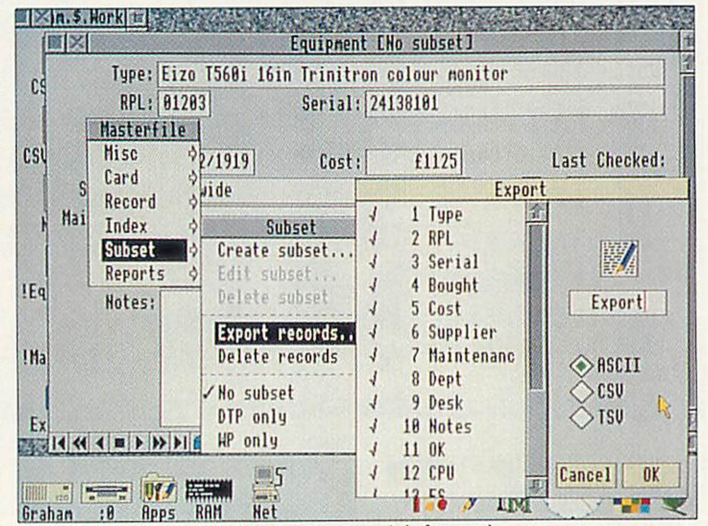
then show the trading address on the normal card layout.

As well as redefining the cards, you can also restructure the whole database by going right back to the descriptor and changing that – perhaps re-ordering the fields so you can enter them in a different order, or adding a new field altogether. *Masterfile* warns you if any data is about to be lost. However, on one occasion this left me with a field which couldn't be edited, though it held valid data.

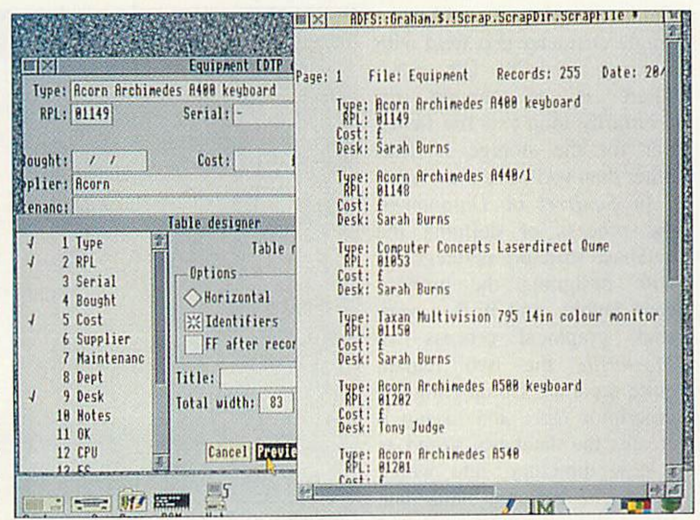
You can import sets of data by dragging in properly-formatted CSV, TSV or text files. This needs to be done carefully, though, because there is no way to control the mapping between your database fields and the fields of the imported file: they need to match perfectly. Also *Masterfile* doesn't allow you to import text with carriage returns in text fields. Exporting data is similar: you can choose a selection of fields to export, and select either CSV, TSV or text format.



Flexibility in the Search and Count function makes browsing easier



Exporting data to a page layout is very straightforward



Reporting is simple to use and adequate for most needs

DATA ENTRY

Browsing through the records and entering data is done by using any of the card layouts. A tape-deck toolbox embedded (*Ovation*-style) in the lower scroll bar, allows stepping through the records, or adding a new record. While browsing, the Search and Count function is particularly flexible and simple to use.

A dialogue box gives you the option to search on any or all fields, and you can include wildcard characters to find fragments of text in the middle of a field. Repeating the search steps through to the next example of the matching text. (*Squirrel* requires the rather more heavyweight Query routine to do this.)

By default, the records are held in order of their original entry. As you step through, you go to the next field added. But you can set up indexes: new orders for the cards. An index can be specified at any time, and is fairly quick. An 800-record database on a fast hard disc was sorted on two fields in under ten seconds.

Indexes can sort on up to three fields, and you can give them names and switch order via a menu choice. Allied to the indexes are subsets: browsing can step through only those records that match a specific set of criteria.

You can select by matching data in a combination of fields, but there are limits on using AND and OR together – basically it's one or the other. For example, constructing a subset of films using ("Disney" OR 12 OR PG) AND < 100 mins isn't possible. There isn't any equivalent of *Squirrel*'s plumbing diagram, nor even of the logical combination of criteria offered by eight-bit stalwart *Viewstore*.

Reporting follows a similar pattern to exporting field data. You can choose, via a dialogue, which fields from each record to include in the report, and add a simple title to the top of the form.

Changing the report format is limited to altering the order in which the field data is printed, and perhaps starting each new record on a separate sheet of paper. However, *Masterfile*'s indexes, subsets and reports interact. If you print a report, the current index is used to order it; only records in the current subset are used.

This makes for a relatively flexible and easy to use system that will be sufficient for most needs. It falls down if you need anything like sub-headings at various points in the report, or automated sub-totalling or averaging of a number field – things both *Squirrel* and *Datapower* excel at. There is one advantage though: because the output is plain text, it is far easier for *Masterfile* to export a report into a page layout application.

END OF A SPECTRUM

Masterfile clearly lies at one end of a spectrum of Archimedes database managers, aimed at rather casual users whose needs for a database lie in 'cataloguing the record collection' or something similar.

For any more ambitious use, another choice – such as *Squirrel* or Iota's *Datapower* – would be more appropriate, though more expensive. And *Masterfile* doesn't even approach the area *S-Base* is aimed at: it's not networkable, not relational, not programmable, doesn't offer even multi-table reporting, and some sections are a little too 'eight-bit'. A shade under £50 is probably about right for what it offers, but beware; as your needs grow, you may need something more sophisticated.

PRODUCT DETAILS

Product: Masterfile 3
Supplier: Risc Developments, 117 Hatfield Road, St Albans, Herts Al1 4JS
Tel: (0727) 840303
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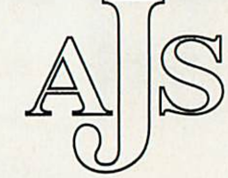
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SPRING FEVER

The Acorn User office looks at the season's releases

New products. The life blood of the Acorn world. Upgrades that keep us in an ever-improving spiral . . .

Without a constant flow of new ideas and improvements, Acorn machines would have disappeared a long time ago, along with the Orics and Dragons of this world. And at the moment, in a sudden burst of new growth, there are new releases popping up all over the place.

We did a quick poll of the *Acorn User* office to find out how some of the more recent releases had been received and what we are still waiting for.



IVAN ALLEN

RELEASE RATINGS

Mark Moxon, technical editor: 'Put a guitarist and a keyboard player in the same room together, and you can get into big trouble: it's a bit like mixing PC users and Arc enthusiasts. I'm a guitarist. Well, I think I am; I'm not so sure my neighbours agree.

'At home I have a Midi set-up on my computer, but *Inspiration*, the sequencer package I currently use, does not cater for guitarists at all, and besides, it doesn't like Risc OS 3. So, you can imagine how happy I was to see *Serenade:* it copes with guitar chords, and it works on Risc OS 3. Now I've got no excuse: next stop, the rock 'n' roll lifestyle we all crave. Move over, Eric.'

Ian Burley, news editor: 'If you use a Risc-based machine, the chances are that – like me – you are a speed merchant. The problem is that, fast though they may be, Arcs are no longer way out in front; even with an Arm3 upgrade.

'As I'm always on the look out for an extra mip, Ground Control's limited edition 35MHz Arm3 upgrade almost exercised my credit card. But in the nick of time I got wind of Aleph One's planned Arm600 processor upgrade. According to Arm Ltd's tests, the 20Mhz version of this latest version of the Arm is around 40 percent quicker than a 25MHz Arm3. The 25MHz version should be even faster.

'I'll have some of that, please. And as if that wasn't enough, Aleph One is also promising that the upgrade will feature a floating point accelerator chip.'

Fin Fahey, production editor: 'I always find myself wishing for things commonplace on other platforms, like 99.7 percent bug-free software, that do not seem to have penetrated the Acorn world. Of course, I am quite devoid of any brand loyalty.

'The outside world has started to peek its nose around the door in the one area of 16-bit games conversions, and there are too many to list. Suffice it to say that I'd love to see *Legend*, *Civilisation* or *Sim Earth* on an Arc and they're all on the cards: sometime.'

Pete Worrall, art adviser for Sandwell AEC: 'I am looking forward to *Architech* from ExpLan UK, which offers a revolutionary means of 3D design. Digitised textures and images can be mapped onto the surface facets of simple or complex plans, and printed out for construction, with the appropriate foldlines and flaps. Design on the Arc with tangible, tactile results will soon become an exciting reality.'

Karen Donaghay, editor: 'An editor's view is always a slightly warped one, since any major new product is good news for *Acorn User*. On this basis, the next Acorn launch is probably the thing that I view with the most anticipation.

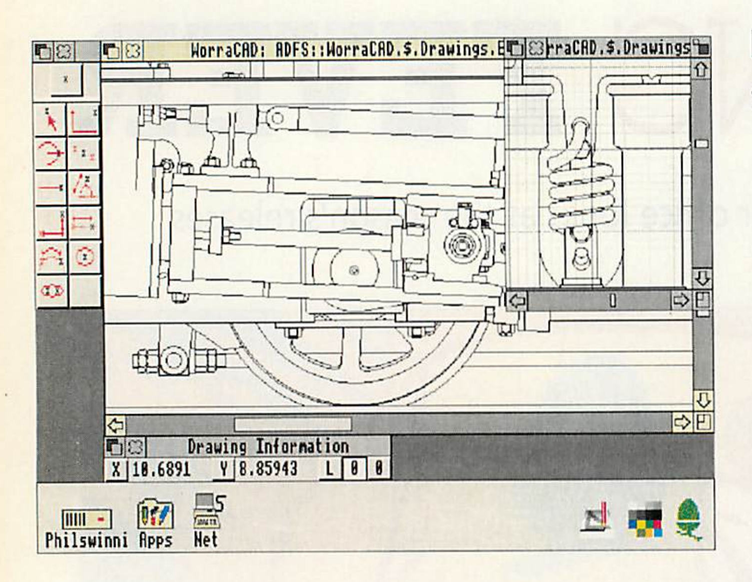
'Although there are no hints from Acorn itself, the next machine is – as always – the subject of much gossip. The option for a built-in PC card? The Arm 700? Perhaps even the long-awaited 24-bit graphics? Whatever Acorn has up its sleeve for the next launch, I'm certainly not the only one who is looking forward to it.

'Meanwhile, recent releases that have made my life more efficient include *Datapower*, which can follow an article through its many guises: from concept, to commission, to feature list. Also, the latest *Faxpack* is something our office could not do without.

'But the upgrade which I await like no other is the version of *Impression* which will, at long last, allow automatic runarounds. Finally, present me with a four-colour separation package and I would be a very happy editor.'

● These are just our views: you probably have your own ideas as to what constitutes an earth-shattering release. Many of the most recent products will be at the *Acorn User* show on 16 April: for more details see our news pages.

Technical Drawing for RISC OS



Launched in 1990, WorraCAD was the first CAD system for RISC OS. After three years of continual refinement, the application has matured into a product essential to anyone creating technical drawings on the Archimedes.

WorraCAD is a 2D technical drawing application for the Archimedes desktop. It has been designed to be a truly practical tool, ideally suited to dealing with the everyday problems associated with precision 2D draughting.

WorraCAD is unique amongst CAD applications for RISC OS in that it uses a floating point, rather than an integer model to represent its data internally. This avoids major problems with respect to accuracy and maximum drawing area. Highly optimised code ensures speedy performance in spite of the extra calculations required.

WorraCAD has seen many improvements over its lifetime, and most recently, has benefited from the addition of ellipses and elliptic arc geometry, and a complete revision of the user interface which is now totally icon driven (although the earlier interface is retained as an option for those who prefer it).

In spite of recent major improvements, WorraCAD's price remains at a very competitive £99.00. Education price is £69.95, and a site licence costs £279.80 (excludes p&p and VAT).



WorraCAD can output files in a wide variety of formats. Drawfiles can be transferred to almost all other Archimedes graphics packages. DXF and HPGL files cater for industry standards.



Technical drawings require the use of different linestyles to show hidden detail, centre lines and so on. WorraCAD provides a range of styles to cover virtually all requirements.



The greatest strength of WorraCAD is its ability to calculate tricky geometric constructions automatically. Tangents, normals, foci and so on can be generated simply by clicking the mouse.



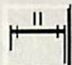
One of the most time consuming tasks at the drawing board is that of hatching. With WorraCAD, you simply select the boundary and any islands to be hatched, click, and the job's done.



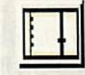
WorraCAD allows virtually unlimited scope for zooming in and out. Because of WorraCAD's unrivalled accuracy, even at 500 000 x magnification, the drawing still hangs together.



The grid system in WorraCAD can be set to display in either orthogonal or isometric modes. The vertical and horizontal spacing can be independently adjusted.



Comprehensive dimensioning to BS308 is provided. Dimensions are associative - if the drawing is stretched, the dimension adjusts automatically. Precision and dimension style are easily controlled.



Plotter output is provided using the HPGL format, the industry standard plotter control language. Output can be sent directly to the plotter, or to file for plotting later, perhaps via a bureau.



Printer output goes via the standard RISC OS printer drivers. A preview mode is available, and a monochrome option is provided for output of coloured drawings to monochrome printers.

Move up to WorraCAD and draw your own conclusions

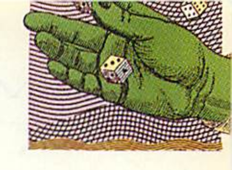


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ADVENTURE PLAYGROUNDS

Clare Johnson finds that computers can make the classroom into a fantasy zone

Picture a primary classroom becoming a tropical rainforest, the undersea world of a turtle or the sett of a badger family. Children and teachers can use their imaginations to turn ordinary places into magical ones with a little imagination, a lot of paint and junk modelling and a great deal of fun.

Computer adventure games encourage exploration and problem solving, and are seldom linked solely to one curriculum area. Many have some kind of theme which can then be used to draw together activities in all subject areas.

Using games of this type in a classroom requires a lot of planning and can take many weeks to work through. Although some computer time might be spent actually playing the game, other software such as word processors, DTP packages and databases are used alongside them. Exploring the variety of language, maths, history, geography and so on that arises can be time-consuming but very rewarding for both teacher and pupil.

There are certain things that adventures need to have. Children love the graphics, and good art work can provoke a lot of discussion and creative productions of their own. Clear language on each screen and not too much reading enables children of all abilities to have a go. A variety of levels of difficulty makes these games more usable in a number of year groups; software is an expensive commodity for many primary schools.

There are a large number of these types of game available on both the Risc OS machines and the older BBC B and Master 128 machines. I have used many of them and have seldom failed to find that children enjoyed playing them, did not want to be told the answers even when the going got tough and all of them changed the classroom into a totally different place.

I've been in newsrooms, a Roman villa, to a distant planet and in teacher's cupboard. In these places we all learnt the subjects the timetable calls maths, English, and science.

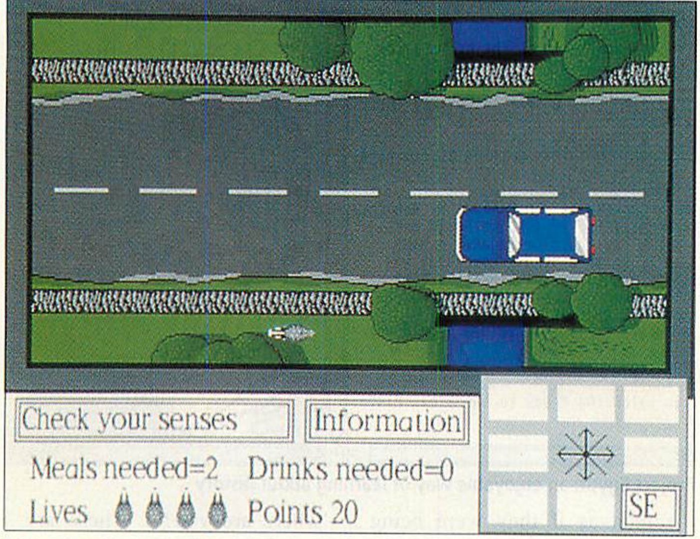
BADGER TRAILS

Sherston Software
Tel: (0666) 840433
£39.95

This is the latest adventure/exploration pack from this company, which has a long tradition of producing excellent games of this type. The pack comes with a video, maps, a teacher's book – without the answers – and a short story book to get the children started. There are two discs, the second of which can be copied to provide work discs for pupils to save screens and finishing positions on.

The exploration is designed around the pupils taking on the role of a badger, who has to be guided back to its sett after travelling too far afield. There is a busy road to cross, streams to negotiate and food and water to find.

We had a lot of discussion before starting, about what senses a badger could rely on, what it might eat, how far off the ground it was and how fast it might move. The children enjoyed this discussion and we started collecting pictures and books about badgers some time before starting the game.



Living out the badger's lifestyle is exciting for children

Movement around the map is by compass directions – so we did some maths on bearings and angles – and the map is an aerial one so we also had a look at other photographs taken from the air to compare the features.

Badger poetry also abounded, as did lots of art work and written work about endangered species.

The game is fairly simple. Most of the eight-year olds got through it in only a couple of hours, but discovered a great deal while doing so. Can badgers swim? How often do they get killed crossing roads? Do they eat meat?

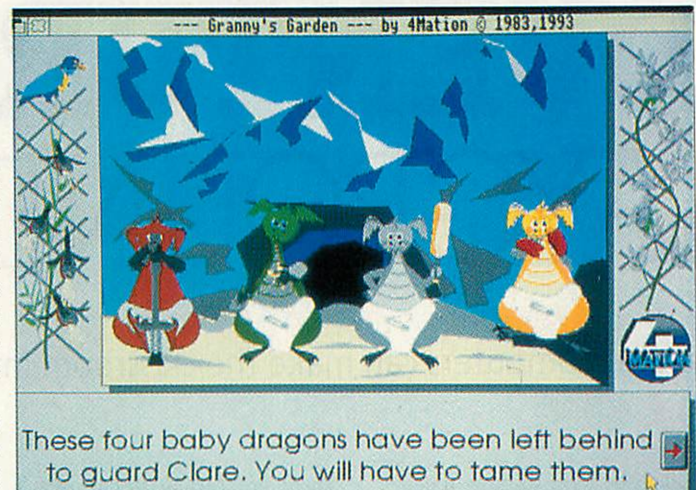
Some children were upset at rabbits being eaten by badgers, but this led us into an interesting discussion about eating meat and vegetarians. They were also fascinated by the fact that badgers will attack other badgers when they encroach on their territory.

The game does have a built-in point system which the children enjoyed, and screens could be saved at almost any point and printed out or put into DTP pages for writing about. The children never needed any help with the software, but occasionally needed help to find where they were on the map. They were overjoyed to discover that the badger could cross the road by going under the bridge. But only when it had had a drink and three things to eat . . .

We all enjoyed this package, and the children were all keen to have another go, even a third or fourth. The graphics are extremely good, and the use of the five senses throughout led us onto a science project about our own senses and disabilities. The adventure only took a couple of weeks, and we didn't get anywhere close to exploring all the directions it could have led us in.

GRANNY'S GARDEN

4Mation Software
Tel: (0271) 25353
£30



Granny's Garden is an old favourite enjoying a 32-bit revival

I did wonder why 4Mation had decided to rework an old eight-bit game for its tenth anniversary, but I was soon playing the whole adventure through – and I know all the answers – with much enjoyment because the graphics are superb.

It was worth playing just to see one of the baby dragons in its nappy, playing on a pogo stick. This game has now been converted to at least ten computers and never ceases to lose its magic. The story is based around a wicked witch and six missing children. You have to find them and you aren't allowed to back out.

The game comes on four discs and each section is reached by finding a password when you have solved the preceding section. The adventure takes children into a fairytale land of witches, giants, dragons who eat chips and oranges, and a magic forest. The problems to be solved all involve some form of logic and children can encounter hazards if they don't do things in the correct order. They do find it frustrating to go back to the beginning each time, but it doesn't seem to stop them and does wonders for their memories.

It took the children about four hours in total to complete the game, but that was broken up into short sessions over a period of time. They needed no help, and the discussions that took place in the groups led us on to story telling, model making, work on minibeasts and insects and a variety of language activities.

The game is Risc OS compliant and we could therefore save screens and use them in other programs. The older version of this software had some very annoying music; it's still there but you can turn it off.

The animation sequences are spectacular and can be viewed through a remote control panel that allows movement through the sequence one frame at a time. It is also possible to enter answers in abbreviated form, though this isn't always consistent. I chose not to tell the children; it encouraged them to spell things correctly.

4Mation has produced a resource pack to go with *Granny's Garden*, containing *Draw* files and photocopyable sheets. The files are compressed, and the utility used is provided on the disc.

It was worth using this new version of *Granny's Garden* for the graphics alone. I felt that we were playing a completely new game, and am sure that a new generation of children will gain great pleasure from it. I would recommend to schools even if they already have the older version. What will 4Mation do with it when it is 20 years old?

LANDMARKS: PROJECT EGYPT

Longman Logotron
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Project Egypt: an enjoyable way of learning about history

The *Landmarks* series of software offer a different type of exploration for children. In each case children can 'talk' to someone from a time in history, whether Kenhirkhopeshef (Shef for short) from Egypt 3000 years ago, a maid in an Elizabethan house or a cabin boy on board Christopher Colombus' ship on the way to discovering the Americas.

Each pack comes with one disc, a teacher's book and a pupils' book which contains various worksheets either directly relating to the software or suggesting activities connected to it.

There are also a variety of pictures alongside the 'conversation' screen and these can be used in other software or printed out.

The conversation with Shef starts with an exchange of names. The words appear on screen as if they were being typed on a teletype printer. This appears slow but does make it easier to read large amounts of text. There is always a picture alongside the conversation which changes as you move around the location.

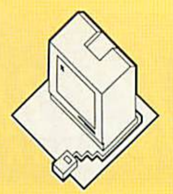
It is possible for the children to talk in everyday language but their are quite a few occasions when Shef doesn't understand and the question has to be rephrased. The system works on key phrases such as 'describe . . .' or 'where are you?' . These are recorded on the function keys to save typing, and the cursor keys are used to move around Shef's world.

There is a map of his village and it shows the location of the tombs, temples, houses and the rubbish heap. You move around the village with Shef and discover things about how an Egyptian boy would have lived 3,000 years ago. We all found it amusing to discover that people built their tombs long before they died. The passing of time is also simulated and is active for three full days. We found it interesting to discover things had taken place while we were not using the computer.

The activity book encourages pupils to use sources other than the disc to find out about the Egyptian civilisation and we found that using this sofware in conjunction with others based on the same subject (such as Sherston Software's *Arcventure 2, The Egyptians* and 4Mation's *sMart* file on Egyptians) gave us a great deal of information about a topic required for study at Key Stage 2 (History National Curriculum) and was fun as well.

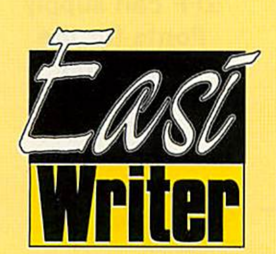
The conversations could occasionally get frustrating, but the teacher's guide does provide a list of keywords so, with some guidance, the pupils can learn a great deal.

The language is well aimed at ten- and 11-year olds, and the pupils' activities provided some useful ideas for classroom work. I found *Landmarks* a very cost-effective and enjoyable way of teaching children about history.



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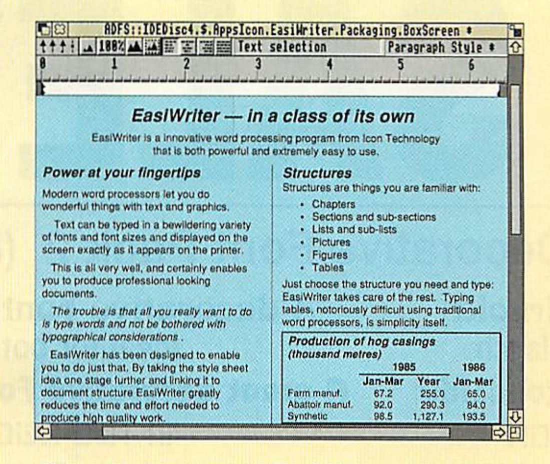
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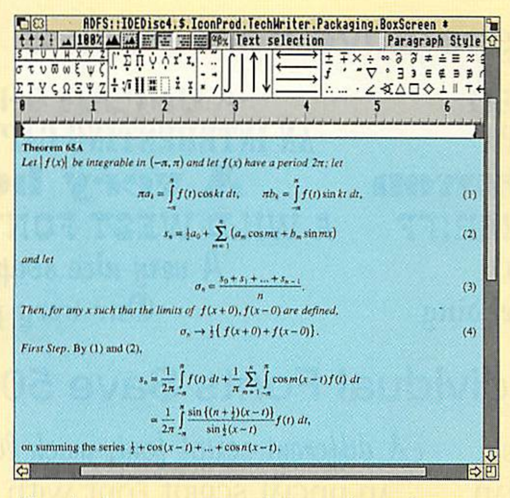


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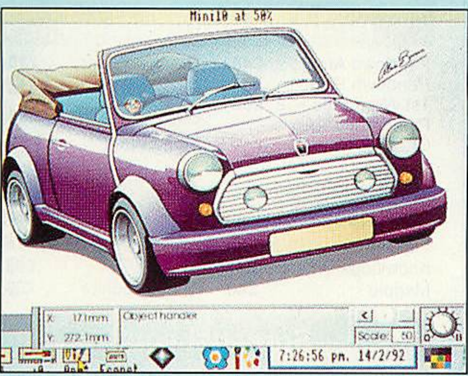
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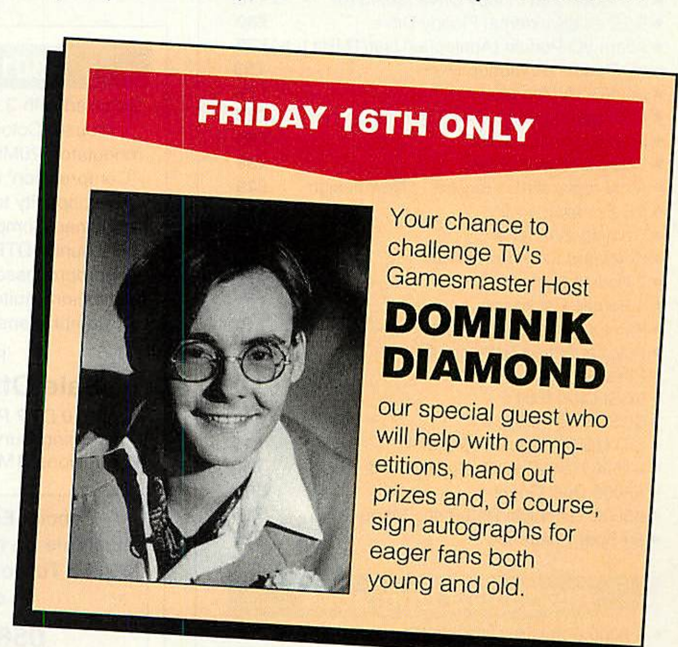
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All prices exclusive of VAT; subject to change without notice & available on request.

Archimedes micro

System	Basic	Colour	Multiscan
A3010-1Mb Family	£424	£625	£769
A3010-2Mb L/C	–	£680	–
A3020-2Mb FD	–	£749	£799
A3020-2Mb HD60	–	£899	£949
A4000-2Mb HD80	–	£949	£999
A4000-Home Office	–	£999	£1049
A5000 No HD	£689	–	–
A5000-2Mb HD80	–	£–	£1399
A5000-L/C 2Mb HD80	–	–	£1445
A5000-4Mb HD120	–	–	£1599
A5000-2Mb ES	–	–	£1299
A5000-2Mb NS	–	–	£1399
Pocket Book	£212	–	–
Pocket Book Class	£2127	–	–

On-Site Maintenance now available on all Archimedes Micros. Please telephone for details.

Archi A4 Notebooks

A4 Notebook with 2Mb RAM	£1399
A4 Notebook 4M RAM/60M HD	£1699

FREE OFFER

When you purchase any of the above Archimedes Micros, we will give 10% of the value of the machine in Hardware or Software of your choice

Archi Accessories

- 3.5" 800K 2nd Floppy Drive (305/310) £118
- 5.25" 800K external Floppy Drive £80
- Acorn I/O Podule (Analogue/User/1MHz bus) £79
- I/O Podule (Analogue/User) £59
- MEMC 1A Upgrade £29
- MIDI add-on to Acorn I/O Podule £27
- MIDI Expansion Card £65
- Econet Network Board £38
- Archi replacement mouse – New design £29
- PC Emulator v1.9 £95
- Floating Point Unit £455
- Keyboard Extension Lead £6
- 2 Podule Backplane £20
- 4 Podule Backplane £25
- Fan for above backplanes £10
- Risc Os Extras Software Disc £5
- Ethernet Card £149
- SCSI Card 8 bit £129
- SCSI Card 16 bit £149
- SID Utilities Discs – Set of 4 £19
- ST506 Hard Disc Controller Card £99
- A5000 Dust Cover £9pr
- A5000 Technical Reference Manual £65
- A4 Spare Batteries £49

RISC OS 3 Upgrades

- A 5000 Software Upgrade Kit £16
- Software Upgrade Kit for the rest £40
- Hardware Upgrade Kit 300/440 £25

A3000 Accessories

- 3.5" External Drive £95
- Monitor Stand £15
- Technical Manual £39
- Serial Upgrade £19
- A3000 Dust Cover £5
- Micro+monitor cover £9
- Acorn Carrying Case for A3000 £10
- A3000 User Port/Midi Upgrade Card £44
- A3000 User/Analogue/IIC I/O Card £38
- A3000 External Podule Case £15

Scan256 Grey Scale Scanning

If you need a 256 grey-scale hand scanner for your Archimedes then look no further.
Scan256 gives you up to 256 levels of grey at a maximum of 400dpi and is supported by state-of-the-art sophisticated software – **for only £185.** This makes it the only sensible scanning and image processing solution for the Acorn 32-bit range. Just compare these features:

- More than one copy of the image held in memory at once.
- Allows multiple consecutive operations without saving the original to disk.
- Highly advanced dithering and image size reduction.
- Convolution digital filtering with over 100 filters gives high quality images from poor quality scans.
- Adjustable scale and size during scan.
- Supports State Machine G8 Graphics Card.
- Includes shearing and rotation.
- Saves images in industry standard formats: TIFF, Sprite and AIM.
- True brightness, contrast and gamma correction.
- Multiple options – scale to page, centre sideways selected area.
- Selectable scanning modes.
- Plus much much more...

Please specify Archimedes type, not compatible with A3010, A3020, A4000.

£185

A3010 DTP Pack

Supplied with 3.5" Floppy Disc Drive and a mouse, Colour Monitor and lead, TV modulator, 20Mb fast IDE Hard Disk Drive, 'Compression' utility to increase the Hard Drive capacity to typically 40Mb, the highly acclaimed Computer Concept's Impression Junior DTP package, EasiWord wordprocessor, Quest for Gold game, applications suite of software packages and comprehensive audio training tape.

RRP: £1095

Sale Offer Price: £739

- A3010 DTP Pack with Learning Curve £839
- Additional 1Mb RAM fitted £39

Special Education discounts available on micros, RAM upgrades, ARM 3 Turbo Card, etc. Please write in or telephone:

0582 48 77 77

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

- **R300**-4 Layer RAM upgrade board (Bare). £25
- **R302**-A3000 – to 2MB RAM Upgrade £29
- **R303**-A3000 – to 2MB RAM Upgrade (expandable to 4MB) £49
- **R304**-A3000 – to 4MB RAM Upgrade £99
- **R305**-A3010 – to 2MB RAM Upgrade £39
- **R306**-A3020 – to 4MB RAM Upgrade £70
- **R311**-A305 – to 1MB RAM Upgrade £30
- **R312**-A305/310 – to 2MB RAM Upgrade £115
- **R314**-A305/310 – to 4MB RAM Upgrade £229
- **R412**-A410/1 – to 2MB RAM Upgrade £25
- **R413**-A420/1 – to 4MB RAM Upgrade £50
- **R414**-A410/1 – to 4MB RAM Upgrade £75
- **R810**-A410/1 – to 8MB RAM Upgrade £579
- **R820**-A420/1 – to 8MB RAM Upgrade £549
- **R840**-A440/1 – to 8MB RAM Upgrade £479
- **A5000** – to 2MB additional RAM Upgrade £82

Desk Top Publishers

Acorn's Archi DTP Package	£69
• Equasor £39; • Expression-PS	£19
Impression 2 DTP Pack	£123
Impression Junior	£65
Impression Business Supplement	£39
Impression II Borders Disc	£19
Ovation DTP	£85
Desk Top Thesaurus	£18

Archi Wordprocessors

Pendown Archi	£48	Graphic Writer	£20
Pendown Plus	£68	Easiwriter	£115
1st Word Plus – 2	£63	EasiWord	£58
Pipedream Spell Checker	£40	Prime Word	£52

Databases

Flexifile	£79	Multistore v2.01	£174
Knowledge Organiser	£42	Pinpoint	£65
Magpie	£40	Pinpoint Junior	£23

Spreadsheets

Eureka	£99	Schema	£89

Business Graphics

GammaPlot	£39	Sigmaplot	£39

Integrated Packages

- Pipedream 3 £116 • Pipedream 4 £146
- Desktop Office – Database, Graphs & Charts, Wordprocessor Spreadsheet, Communications £98
- Desktop Folio – Wordprocessor, Desktop & Interactive Publishing. Ideal for school £75



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

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BBC Education Software

A vous la France	French programs for beginners	£29
Au restaurant/Accident de route	French games for 12 years +	£26
Bolougne and oh les	French program for beginners	£26
Computer control	Program simulating computer control	£26
Computers at work	Primary education program	£17
Espana Viva	Spanish educational programs	£20
Folks Tales	Listening and reading for ages 7+	£22
Geordie Racer	Look and read for ages 7+	£22
Hall of Mirrors	Practice word & number skills	£22
Help your child learn basic mapwork 2		£18
Inside Science	Four common science subjects	£22
Letters and pictures	Educational programs for 6-8 years	£15
Make a wildlife garden	Explore wildlife/weather/garden growth	£22
Maths with a story 1	Primary level maths programs	£20
Maths with a story 2	4 further maths programs	£20
Note invaders	Learn sheet music for 7-Adults	£15
Numbers & Pictures	Early number learning (4-6 years)	£15
Picture craft	Geometrical design & Colouring	£17
Puncman 1 & 2	Learning Punctuation (7-13 years)	£15
Puncman 3 & 4	Learning Punctuation (8-14 years)	£15
Puncman 5, 6 & 7	Learning Punctuation (8-15 years)	£15
Ramayana Tales	Simple Desktop Publisher using pictures & characters from the Ramayana	£22
Skyhunter	Look and read educational adventure	£22
Technology and design	Problem solving programs	£22
Through the dragons eye	Adventure game and Map reading	£22
Fun School 3 (Under 5)	Varied range of Education subjects	£17
Fun School 3 (5-7)	Varied range of Education subjects	£17
Fun School 3 (Over 7)	Varied range of Education subjects	£17

Archi Educational Software

- Animated Alphabet (3-6 yrs) £21
- Arcventure (8-12 yrs) £29
- Bookbinder £43
- Bumper Disc £14
- Bumper Disc 2 £14
- Craftshop 1 £19
- Craftshop 2 £19
- Converta-Key £16
- Data Word £16
- Desktop Stories £35
- DigiSim £35
- Dream Time (5-7 yrs) £23
- Farm (5-7 yrs) £19
- Fleet Street Phantom (9-13 yrs) £25
- Fun School 3 Red (up to 6 years) £17
- Fun School 3 Green (6-8 years) £17
- Fun School 3 Blue (8 years +) £17
- Gate Array Teaching System £68
- Glimpse Clip Art Utility (7-16 yrs) £8
- Highlighter (6-16 yrs) £42
- Jigsaw £19
- Mapventure (9-13 yrs) £24
- Microbugs £24
- Money Matters £16
- Nature Park Adventure (7-9 yrs) £27
- Numerator £60
- Picture Book £16
- Recall (6-13 yrs) £39
- Sellardore Tales £24
- Snippet £37
- Space Mission Mada (9-13 yrs) –
- Sting of the Dump (9-13 yrs) £22
- Viewpoints (9-12 yrs) £33
- Wizard's Revenge (7-10 yrs) £17
- Worst Witch (7-10 yrs) £25

Archimedes Software

GRAPHICS

3D Construction Kit	£39
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ARCtist	£19
ARCticulate	£19
Art Works	£139
Atelier	£60
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Clip Art Set 2	£28
Concept Designer	£23
Craftshop 1 & 2	£28
Euclid 2	£50
Graph Box	£59
Graphbox Professional	£107
HotLink Presenter	£40
Illusionist	£69
Kermit	£46
Mogul	£17
PCAD Educ.	£395
Pro Artisan	£70
ProCAD	£475
Prime Art	£46
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Revelation 2	£80
Titler	£119
Tween	£29
Puncman 1 & 2	£16
Puncman 3 & 4	£16
Pysanki	£14
Quazer	£10
Real McCoy 2	£23
Real McCoy 3	£22
Redshift	£14
Return to Doom	£16
Repton 3	£14
Saloon Cars Deluxe	£27
Sim City	£19
Spitfire Fury	£22
Splice	£25
Sporting Triangles	£24
Superior Golf	£14
Superpool + Break 147	£22
Swiv	£19
Talisman	£12
Timewatch	£24
Trivial Pursuit	£22
Twin World	£15
U.I.M.	£23
White Magic 2	£15
Worldscape	£16
XFire	£19
Zelanites	£23

GAMES

Air Supremacy	£17
Apocalypse	£14
Arcade 3 Compilation	£12
Battletank	£10
Black Angel	£27
Boogie Buggy	£14
Break 147 + Supa Pool	£19
Bughunter in Space	£12
Bughunter/Moondash	£10
CADet	£135
Casino	£10
Cataclysm	£19
Caverns	£10
Chess 3D	£16
Chocks Away	£27
Compendium	£32
Chocks Away Extra	£14
Chuck Rock	£18
Conqueror	£15
Cyber Chess	£38
Ego Repton 4	£–
Elite	£33
Enter the Realm	£19
E-Type Compendium	£20
E-Type Designer	£13
Family Favourites	£13
Galactic Dan	£19
Gods	£24
Grievous Bodily Arm	£19
Holed Out Designer	£13
Holed Out Golf Comp	£20
Hostages	£14
Inter Dictor 2	£26
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Jahangir Khan Squash	£19
Jigsaw	£27
Lemmings	£20
Oh no more Lemmings	£15
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Lotus Turbo Challenge	£19
Mad Prof Mariarti	£17
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MahJong Patience	£15
Manchester United II	£19
Nebullus	£21
Nevryon II	£20
Omar Sharif's Bridge	£23
Pandoras Box	£18
Pipe Mania	£17
Play It Again Sam	£–
Populous	£23

Miscellaneous

Ancestry	£59
Arccomm 2	£38
Arcterm 7	£64
Armadeus Sound	£60
Avante Garde Fonts	£23
BBC DFS Reader	£6
Broadcaster Loader	£65
Chameleon	£34
Chart Well	£25
Chatter	£34
Compression (CC)	£38
Craftshop 1	£27
Craftshop 2	£27
Desk Edit 2	£29
Equasor	£38
FlexiFile	£97
Genesis	£10
Genesis Plus	£68
Genesis 2	£99
Investigator 2	£22
Magpie 2	£42
Notate	£42
Numerator	£66
Pin Point	£65
Polyglot	£16
Presenter 2	£29
Presenter Story	£145
Prophet Accounts	£132
Prophet Demo Disc	£10
Rainforest	£17
Revelation 2	£95
Rhapsody in Blue 2	£45
Score Draw	£46
Show Page	£127
Speech!	£15
The Victorian	£17
Time Tabler	£549
Toolkit (Clares)	£35
Touchtype	£40
Tracker	£39
Turbo Driver BJ10E	£42
Type Studio	£43
Vox Box	£46
Wimp Programmer's Toolkit	£16
WorldScape	£17

LANGUAGES

Desktop C	£199
Macro Assembler	£40
Robo Logo	£69
BASIC Compiler	£77
Logotron Logo	£45
Risc BASIC	£120
Risc FORTH	£110
Cambridge Pascal	£95

Minerva's Archimedes Software

EasyWord	£18
Home Accounts	£35
Time Tabler	£549
System Delta	£59
System Delta Program Reference Manual	£29

Stand alone Business Accounts Packages
Sales; Purchase; Order Processing and Invoicing; Nominal Ledger; Stock management
£79 per module

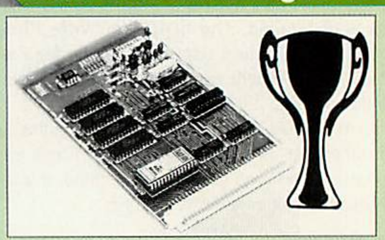
Cortian CKAI Interface

Eliminates the need to have a User port in A3000, A5000 and any other Archimedes without User Port. Fits to the Econet socket. £29

Concept Keyboards

- A4 Standard Pack £95
- A4 Primary Pack £100
- A4 Designer Pack £110
- A3 Standard Pack £99
- A3 Primary Pack £105
- A3 Designer Pack £110
- Universal 2010 Keyboard A3 £115
- Universal 2010 Keyboard A4 £110

Archi Real-Time Digitiser



Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £75

A Set of Colour Filters for colour image grabbing using a video camera £16

Archi Graphic Tablet



Special Price £199

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£20**

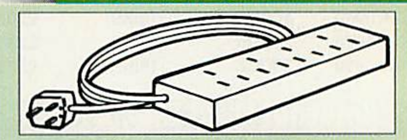
Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus £105

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightning or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets.
Supplied wired up with mains plug ready for use.
Can be screwed to floor or wall if required.
Very useful for tidying up all the mains leads from your peripherals.

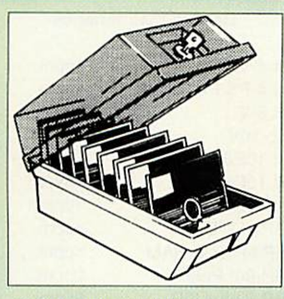
£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£16

Antistatic Lockable Disc Storage Units



- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M100** – holds 100 3.5" discs **£6.99**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

£2

3M – Diskettes

Lifetime warranty on 3M Discs

- *10 x 5.25" S/S D/D 40T (744)* **£5**
- *10 x 5.25" D/S D/D 40T (745)* **£5**
- *10 x 5.25" S/S D/D 80 Track (746)* **£6**
- *10 x 5.25" D/S D/D 80 Track (747)* **£7**
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* **£8**
- *10 x 3.5" S/S D/D 40/80 Track* **£6**
- *10 x 3.5" D/S D/D 40/80 Track* **£6**
- *10 x 3.5" Double Sided High Density* **£10**

Top Quality Diskettes

Watford's life time guaranteed disc are supplied complete with self stick labels & plastic library case.

- *10 x **M3** 3.5" D/S D/D 80 Track* **£6**
- *10 x **M9** 3.5" D/S High Density* **£10**
- *10 x **M4** 5.25" S/S D/D 40 Track* **£5**
- *10 x **M5** 5.25" D/S D/D 40 Track* **£5**
- *10 x **M7** 5.25" D/S D/D 80 Track* **£6**
- *10 x **M8** 5.25" D/S H/D Hi-Density* **£9**

Special Bulk Offer Discs

(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S/S 40T	D/S 40T	D/S 80T
• Without Sleeves 5.25"	£25	£30	£35
• With Sleeves 5.25"	£28	£33	£38
• 3.5" D/S D/D	£21 for 50		£39 for 100
• 3.5" D/S H/D	£40 for 50		£75 for 100

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

3.5" Disc Drive



These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	**£59**
• **CLD35:**	Twin Disc Drives, 800K	**£109**
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	**£82**
• **CD35:**	Twin Disc Drives, 800K	**£126**

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drives in Monitor Stand



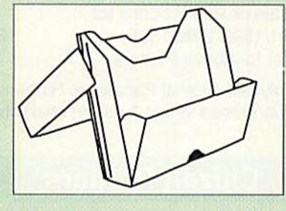
• **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

£154

Plastic Library Cases



- **DLC1** – Holds 5 x 3.5" Discs. **£1.50**
- **DLC2** – Holds 10 x 3.5" Discs. **£1.90**
- **DLC3** – Holds 5 x 5.25" Discs. **£1.60**
- **DLC4** – Holds 10 x 5.25" Discs. **£2.00**

Disc Albums

Attractively finished in leather-look PVC Vinyl

- **DW1** – Holds 6 x 3.5" Discs **£2.50**
- **DW2** – Holds 6 x 5.25" Discs **£3.00**
- **DW3** – Holds 20 x 5.25" Discs **£3.50**
- **DW4** – Holds 40 x 3.5" Discs or 5.25" Discs **£4.50**

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Acorn & Watford DFSs

- Watford sophisticated DFS ROM **£16.00**
- Watford DFS Kit complete **£49.00**
- DFS Manual (comprehensive) **£6.95**
- Acorn DNFS ROM **£17.00**
- Acorn ADFS ROM only **£25.00**
- Acorn 1772 DFS ROM Kit **£49.00**
- Acorn DFS Kit complete **£48**

Watford's MkII 1772

Single/Double Density DFS

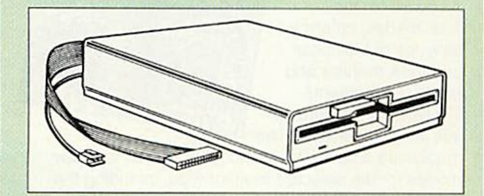
Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1772 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1772 DFS, plus many more added features.

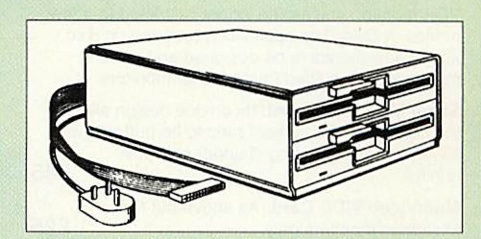
- Complete Kit — Special Price **£44**
- DDFS Manual — (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£26**

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"





Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• **CLS400S:**	Single, 40/80 track 400K Double sided Drive	**£70**
• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£138**
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	**£80**
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£149**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Continued→ → → → → → → → →

Microvitec Monitors

- **1431** – Standard Resolution Monitor #£175
- **1451** – Medium Resolution Monitor #£215
- **Cub3000** Medium Res for A3000 #£195
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239
- **Touchtec 3000** £–

Includes 3 years parts & labour warranty

Multiscan Colour

Eizo F550i	£749	Taxan 787	£238
Eizo T560iT	£1345	Taxan 787LR	£262
Eizo T660i-T 20"	£1655	Taxan 795PC	£445
Eizo 9060	£398	Taxan 875+	£729
NEC 3FG	£359	Taxan 875+ LR	£799
NEC 4FG	£462	Taxan 970	£1230
NEC 5FG	£839	VIDC Enhancer	£25
NEC 6FG	£1509		

Aries AlphaScan Monitor

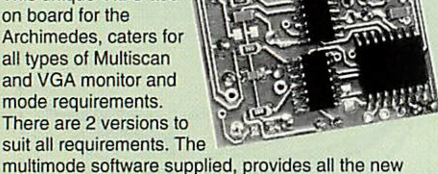
Its multiscan circuitry provides automatic adjustment for frequencies between 30 and 60KHz horizontal, and 50 and 90Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The VIDC Adaptor supplied with the monitor allows high resolution operation in all screen modes. **£325**

- Aries Alphascan 17" Plus **£585**

Philips Monitors

- **BM7502** 12" Hi-res Green Monitor £88
- **CM8833** 14" Med. Res Colour Monitor £195
- Dust Cover for Philips Monitors £6
- Spare Monitor Leads (various) £7

VIDC Enhancer



This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A Desk Top application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: Its unique design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control **£45**

MultiVideo VIDC Card: As above but for MultiScan monitors only. **£25**

Integrex Ink Jet Printers

- Colour Jet 132 Printer £425
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £21 • Black Cartridge £12.40
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123
- Colour Jet 2000 £599
- Betajet Ink Jet Printer £185
- Betajet Cut Sheet Feeder £43
- Integrex Colourjet Series 2 £335
- Auto Sheet Feeder for Series 2 £45

Printer Leads

- BBC Centronics 4' £5; 6' £6
- Archi Parallel 2m £5; 5m £9 10m £13
- PC Parallel 2m £5; 5m £9; 10m £13
- 25 pin D Male/Male 2m £5; 5m £10
- Centronics Double Ended 4' £5
- Centronics Double Ended 6' £6
- RS232 Leads Various £POA

Star Printers

	Printer	CSF	Ribbon
LC15	£190	£119	£4
LC20	£104	£69	£4
LC100C	£126	£69	£12
LC24-15	£245	£119	£5
LC24-100	£143	£69	£5
LC24-200	£168	£69	£5
LC24-200C	£214	£69	£12
LC200 C	£151	£69	£12
STAR JET	£169	£43	£16
XB24-200C	#£324	£80	£12
XB24-250C	#£389	£139	£12
ZA-200C	#£260	£–	£12
ZA-250C	#£324	£–	£12

Includes 12 months on-site warranty

- Star/Archimedes Colour Printer Driver £15
- Black Ribbons for Colour Printer £5
- Serial 8K Serial Interface LC10/15/24/200 £52
- 32K Buffer LC/XB24-10; 15; 200 £52

NEC Pinwriter Printers

	Printer	CSF	Ribbon
P220	£189	£59	£6
P30	£235	£59	£6
P62	£342	£89	£8
P72	£406	£115	£8
P90	£579	£115	£8

- Black Ribbons for P20; P30 £6
- Ribbons for P60/70/P90 Black £8; Colour £14
- P60/70 Colour Option Kit £59
- CSF for P20 £59; P60 £89; P70 £89

Panasonic Printers

	Printer	CSF	Ribbon
KX-P1123	£126	£59	£6
KX-P1170	£98	£59	£6
KX-P1624	£264	£126	£8
KX-P1654	£330#	£126	£8
KX-P1695	£267	£126	£8
KX-P2123M	£144	£79	£8
KX-P2123C	£194	£79	£15
KX-P2124	£215	£89	£8
KX-P2180M	£126	£79	£8
KX-P2180C	£143	£79	£15
KX-P2624	£269	£126	£8

Includes 12 months on-site warranty

- Dustcover for 80 column printers £6
- Serial Interface for above Printers £46
- Black Ribbons for P1081, 1180, 1124 £6
- Brown, Blue or Red Ribbons for KX-P1081/1592/1595/1695 £9 each
- 32K Buffer for above Printers £16

P.S. We only sell original Panasonic Ribbons which are guaranteed to last 3 million characters

Citizen Printers

120D+	£98	Swift 200	£178
Swift 9	£145	Swift 240	£200
Swift 9X	£185	Swift 240C	£212
PN-48	£189	Swift 24X	£299
ProJet	£299		

- AH29804 Manual Cut Sheet Feeder for Swift 9/24/124. Holds 50 Sheets £29
- Cut Sheet Feeder for 80 col. printers £75

+ FREE 2 years Parts and Labour warranty on all Citizen Printers

- Swift 9 Colour Option £19
- Swift 24 Colour Option £29
- Swift 24 Ribbons Black £4 Colour £13
- Swift 24X Ribbons Black £8 Colour £16
- Citizen/Archimedes Colour Printer Driver £15



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Laser Printers

All Laser Printers include 12 months On-site maintenance

Brother HL4-VE	4ppm	£594
Brother HL4-PS Postscript	4ppm	£974
Brother HL8-V	8ppm	£848
Brother HL-10V	10ppm	£1045
Brother HL10PS	10ppm	£1329
Brother HL10DV	10ppm	£1149
Brother HL10DPS	10ppm	£1445
Canon LBP4 LITE	4ppm	£492
Canon LBP4+ 1.5M RAM	4ppm	£644
Canon LBP-8III Plus	8ppm	£945
Canon LBP-8 plus IIIR	8ppm	£1435
Canon LBP-8 IV 600 DPI	8ppm	£993
Epson EPL4000	6ppm	£478
Epson EPL5200 – NEW –	6ppm	£POA
Epson EPL7500	6ppm	£1139
Epson EPL8100	10ppm	£920
Fujitsu VM800 (Best Buy)	8ppm	£549
HP Laserjet IIIP	4ppm	£639
HP Laserjet IIISi PS	16ppm	£2469
HP Laserjet IV (600 dpi)	8ppm	£1035
HP Laserjet 4M PS	8ppm	£1425
NEC Silentwriter S62P P/script	6ppm	£994
NEC Silentwriter 266	8ppm	£669
NEC Silentwriter 290P P/script	8ppm	£1469
NEC Silentwriter S102	8ppm	£995
OKI OL400	4ppm	£440
Panasonic KX-P4410	5ppm*	£462
Panasonic KX-P4430 Satin Print*	5ppm*	£594
Panasonic KX-P4451	11ppm*	£915
Panasonic KX-P4455 Postscript	11ppm*	£1249
Star LP-4 Postscript	–	£774
Star LP-8 III 2	8ppm	£1249
Star LP-8 III	8ppm	£899
Star LP-8 Star(post)script	8ppm	£1130
Star LS-5	5ppm	£489
Star LS-5 EX (RISC Based)	5ppm	£599
Star LS-5 TT True Type + Mac	5ppm	£775

* Now with 2 years On-site warranty

Laser Toners

Canon 2, 3 & 4	£52	Laserjet HP IIP & IIIP	£54
Epson GQ	£13	Laserjet II/D, III/D	£60
EPL4/41/4300	£55	Laserjet 4 & 4M	£75
EPL7100/7500/8100	£117	NEC SWriter	£84
		Star LP4	£54
KX-P4420/50/55	£20	Star LP8	£69
Qume Crystal (3)	£75	Star LP8/Canon 8	£59

Laser RAM Upgrades

Type	1M	2M	4M	
IIP; III/P	£49	£80	£132	
II & IID	£60	£96	£142	
LJ4/4M	£–	£75	£175	8M/£279
EPL4100	£–	£120	–	512K/£52
Canon LB8	£139	£275	–	
KX4420/50	£59	£89	£149	
NEC S62/S102	£99	£180	–	
Star LPB	£139	£275	–	

Laser Drum & Developer

- Epson Drum GQ5000 £93 EPL7100 £129
- Panasonic 4420 Drum £60 Developer £80
- Panasonic 4450 Drum £93

Jetpage Postscript Cartridge

- HP IIP/III £225 IID & IIID £227

Various Add-Ons

- HP Adobe costscript + Cartridge £359
- HP Premier Font Collection £28
- Laserjet various Font cartridges from £45
- Canon LBP-4 Lower Cassette Tray £96
- HPIIP/IIIP Lower Cassette Tray £96
- Laserjet 4 Powered envelope feeder £199
- LP4 500 Sheet paper cassette 3rd Bin £205
- Ethernet Card for Laserjet 4 £359

Laser Direct

P.S. We have now discontinued Laser Direct as the Hewlett Packard Laserjet 4 printer offers better facilities at a lower price. See above.

Hewlett-Packard Printers

DeskJet 500	#£272	DJ Portable	£283
DJ550 colour	#£459	DJ500 colour	#£355
Paint Jet XL	+£1199	Paint Jet	+£495
QuietJet plus	£399	PaintJet XL300	+£1779

+ Includes 12 months on-site warranty
Includes 3 years extended parts & labour warranty
- For additional £49, we will convert above 3 years warranty, to 3 years on-site maintenance warranty
- Paintjet Cartridges Black £15; Colour £23
- DJ Portable CSF £49; Carrying Case £49

Desk Jet 500 Accessories

- 256K RAM Cartridge £69
- HP Epson FX Emulation Cart. (500 mono); £45
- Ink Cartridges Black £14; Colour £23
- High Capacity Black Ink Cartridge £21
- DJ500 Colour Archimedes Printer Driver £15
- Dust Cover £6
- DJ500C Printer Driver for RISC OS 2/3 £15
- DJ550C Printer Driver for RISC OS 2/3 £15
- 636G 50 x Transparencies A4 £32
- 636J 50 x Glossy Paper A4 (also XL) £25
- 630Z 50 x Cut Sheet Paper A4 £12

HP Paintjet/XL Accessories

- **630P** 200 Z-Fold paper 8.5 x 11 £14
- **630Q** 50 Transparencies 8.5 x 11 £39
- **630S** 50 Transparencies A4 £40
- **630Y** 200 Cut Sheets 8.5 x 11 £14
- **631Y** 200 Cut Sheets A4 £18

Plug In Font Cartridges for DJ 500

- 22706B – Prestige, Elite, Line Draw fonts £55
- 22706C Letter Gothic & HP Line Draw fonts £56
- 22707P – Proprint Emulation Cartridge £57
- Desk Jet Unlimited (Book No VAT) £19.75

Canon Bubblejet Printers

	Printer	CSF	2nd Bin	Ink Cart
BJ10EX	£166	£43	–	£16
BJ10SX	£205	£43	–	£16
BJ200	£275	–	–	£16
BJ300*	£335	£88	£65	£12
BJ330*	£369	£110	£79	£12
BJC800C	£1329	–	–	£16

* Includes 12 months On-site warranty

- Spare Battery pack for BJ10E £33
- BJ10EX – Archi Turbo Driver £42

Special Offer:
Canon BJ10EX Printer + CC's Turbo Driver £209

Epson Printers

	Printer	CSF	Ribbon
EX1000C	£428	£–	£6
FX870	£273	£47	£4
FX1170	£339	£69	£6
LQ100	£148	£–	£4
LQ570+	£205	£47	£4
LQ870	£359	£47	£6
LQ1060	£585	£155	£6
LQ1070	£310	£69	£6
LQ1170	£434	£69	£6
LQ2550	£673	£–	£6
LX100	£116	£–	£4
LX400	£94	£69	£4
LX850+	£135	£69	£4
LX1050	£203	£125	£6
PSQ870	£409	£59	£23
SQ1170	£560	£155	£23
SQ2550	£669	£–	£23
Stylus 800	£244	£–	£10

RS232 Interface Standard £28; +8K Buffer £75
Tractor Feed for: LQ100 £29; FX850/LQ800/850 £69; FX/LQ1050 £85; LQ2500/2550 £90

- Dustcovers for Epson 80 col printers £6

Accessories

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- Multifont Card for LQ550/850/1050 £95

Roland Plotters

- DXY1100 £499
- DXY1200 £649
- DXY1300 £869
- Sketchmate A4 £308
- Sketchmate A3 £475
- HP7440 £670
- HP7570 £2015
- HP7475 £899
- HP7575 £2589
- Roland plotter Pens, Fibre tip £7.50

Fujitsu Printers

- B-100 InkJet – HP Deskjet compatible 300dpi, whisper-quiet & 6 resident fonts #£159
- B-200 InkJet – HP Desk Jet compatible 300dpi. Built in Cut Sheet Feeder. Optional 2nd Bin/Tractor available #£249
- DL-1150 Dot Matrix – 24 pin, 110 column Colour optional £199
- DL-1150colour Dot Matrix – 24 pin, 110 column With colour option £235

- DL1250 £344
- DL3600 £439
- DL4600colour £799
- DL5600colour £1049
- DL5800 £999
- DL1250colour £344

FREE 1 Year On-site maintenance.

- B-100 Cut Sheet Feeder £59
- B-200 2nd Bin Sheet Feeder £89
- B-200 Tractor Unit £59
- B-100/200 Ink Cartridges £14
- DL-1100 Colour Upgrade £39
- DL-1100 Black Ribbon £5
- DL-1100 Colour Ribbon £11
- VM 800 Toner Cartridge (8000 pgs) £99

Full range of Fujitsu Printers available at very competitive prices. Please telephone for details

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £21
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 2,000 Sheets 15" x 11" Fanfold Paper £16
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £21

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).
Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 off, 90 x 36mm (Single Row)	£6.00
1,000 off, 90 x 36mm (Twin Row)	£6.25
1,000 off, 90 x 49mm (Twin Row)	£7.50
1,000 off, 102 x 36mm (Twin Row)	£6.75

Laser Printer Labels on A4 Sheets

3750 off, 70 x 29mm (3 Rows x 10)	£15.50
2400 off, 70 x 37mm (3 Rows x 8)	£15.25

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
BBC B/BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£3.25	£5.00
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£5.50	£6.00
LQ1050/LQ2500	£12.00	–
LX400/800/850	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00

Dust covers for most 80 column printers available at £5 each

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £19
132 Column version £29

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Type

Connects	Serial	Parallel
2 to 1	£10	£10
3 to 1	£14	£15
4 to 1	£19	£20

Professional Type

Connects	Serial	Parallel
2 to 1	£15	£16
3 to 1	£20	£23
4 to 1	£30	£34

Cables extra at £5 each

Cross Over Manual Switch

2 In/2 Out Parallel	£29
2 In/2 Out Serial	£28
3 In/2 Out Serial	£36

Auto Printer Sharer

Connects	Serial	Parallel
2 to 1	£34	£36
4 to 1	£52	£53
8 to 1	–	£85

256k Multi Spooler

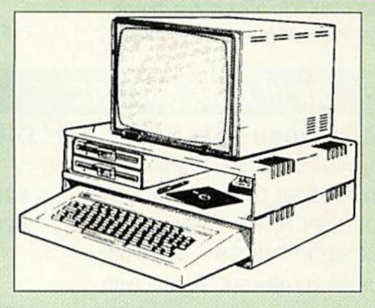
These Auto Parallel Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out £125
- 4 In/2 out £139
- 8 In/1 out £185

Compact Converter Units

Serial to Parallel £32 Parallel to Serial £32

Plinths for the BBC Master and A3000

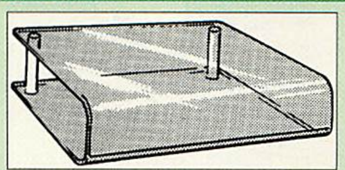


- Single Master Plinth 490 x 310 x 105mm £14
- Double Master Plinth 490 x 310 x 210mm £26
- A3000 Single Plinth (very sturdy & precision made), has a slot on the left for the switch & cut out on the right for 3.5" Disc Drive £15



CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 250234 or 233383

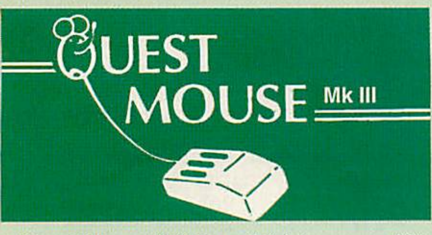
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version £16 (carr £3)
136 Column version £20 (carr £4)

Continued→ → → → → → → → →



- Quest Mouse III & Quest Paint £49
- Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont £69
- Quest Mouse III only £25
- Quest Paint Software only £28
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Conquest (Quest Paint Extension) ROM £24
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18
  (P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

Mouse Cleaning Kit

To obtain trouble free operation and prolong the life of your mouse, the high tech rodent requires regular cleaning. Our deluxe mouse cleaning kit is ideal for the purpose £3

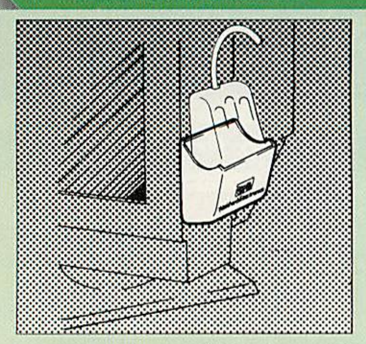
Archi Mouse Port Splitter

Our handy little splitter unit eliminates the risk of damaging your micro due to constant plugging and unplugging of the mouse by allowing you to connect both, a joystick and a mouse simultaneously to your Archimedes. £15

Mk III AMX MOUSE

- **AMX Mouse plus Super Art £49**
  (Please specify for BBC, Master or Compact)
- AMX MOUSE ONLY £25
- AMX SUPERART Package £26
- AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse £25
- PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker £13
- AMX DESIGN (ROM) £29
- AMX EXTRA EXTRA £16
- MOUSE MAT £3

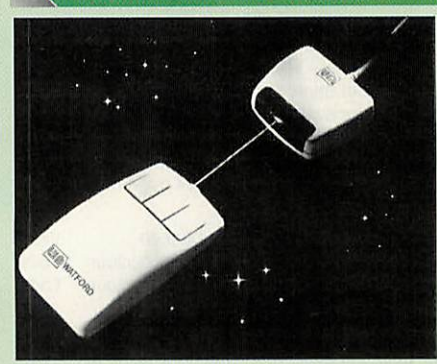
WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive etc.

Only £3

Archi Cordless Mouse

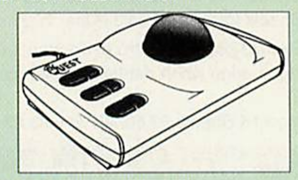


Features
- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 seconds inactive
- Auto Power Shut-Down after 20 seconds inactive

Price £32

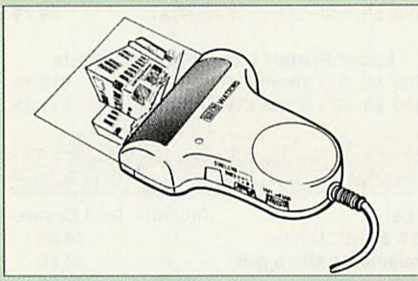
Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version £25
QT-20 Archimedes Version £26

Beeb Hand Scanner



Watford Beeb HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs!

Beeb HandScan & Firmware **£99**

Archi Mk II Hand Scanner

Watford's Mk II hand scanner has a maximum resolution of 400 dpi. The scanning width is 4". The sophisticated software is supplied in a 64K ROM, located on a standard single width expansion podule. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. Other facilities include Cropping and scaling to any size including stretching and squashing in X and Y directions separately. Colour tinting. X and Y flip. Edge detection which turns solid objects into outlines.
Images can be printed on any printer supported by RISC OS.
On-screen help is provided via the RiscOS interactive help facility. (Please write in for full technical details).

AHS-4 Archi 300/400 Version £109
AHS-3 Archi A3000 Version £119



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Wapping Editor Software Pack £49
Wapping Editor plus Mouse £69

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out. **£15**

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are two Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions. **£12**

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only). **£13**

Archi A4 Scanner



The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

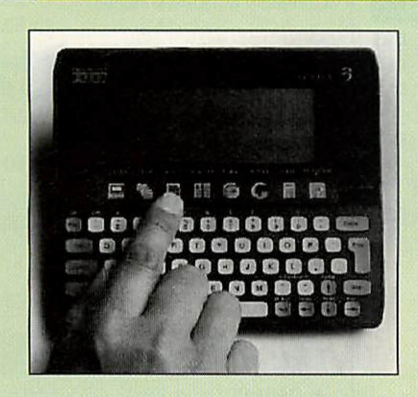
Archi A4 Scanner	£259
Sheet Feeder for above	£75
Scanner + Sheet Feeder	£349

Z88 Portable Micro



- Z88 Portable Micro £POA
- 32K RAM Pack or 32K EPROM Pack £16
- 128K RAM Pack or 128K EPROM Pack £32
- 512K RAM Pack £86 • 256K Eprom Pack £55
- Z88 Eprom Eraser Unit £38
- Z88 Carrying Case £8
- AA Nicad Rechargeable Battery £1.50
- Battery Charger Compact & Fast £6
- Z88 Serial Printer Cable £8
- Z88 Parallel Printer Cable £18
- Z88 to BBC Link £8 • Z BASE £49
- Z88 to PC Link II £27 • Z88 to Macintosh £32
- Z88 Mains Adaptor £9 • Z88 Modem £99

Psion Series III



Psion Series III Computer
- Series 3 128K £155 • Series 3 256K £179

RAM Solid State Discs (SSD)
- 128K £68 • 512K £170 • 1Mb £255

Flash Solid State Disc (SSD)
- 128K £34 • 256K £59 • 512K £102
- 1Mb £170 • 2Mb £255

Communications
- Parallel Interface Link £25
- RS 232 Serial Link for PC £58; Mac £59

Various
- Mains Adaptor 9V AC £12
- Spreadsheet £59
- Professional Finance £42
- Spelling Checker/Thesaurus £42

HP Palmtop PC

- HP95LX 512K Palmtop PC £199

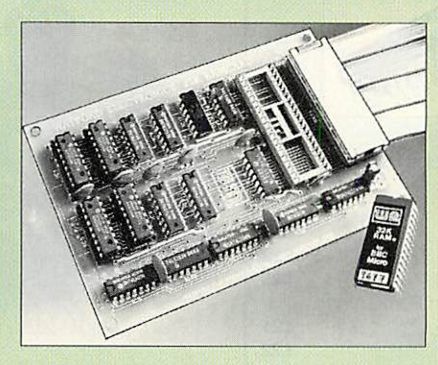
P.S. Above price includes Lotus 123, Desk Diary and Memo softwares in ROM

- HP Connectivity Pack £55
- HP95LX 512K RAM Upgrade £POA

Fax Machines

Brother 305#	£335	Pana UF121	£320
Brother 450#	£375	Pana UF128M	£415
Brother 550M#	£455	KX F2090BE	£488
Canon 170	£520	Tosh TF132	£349

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

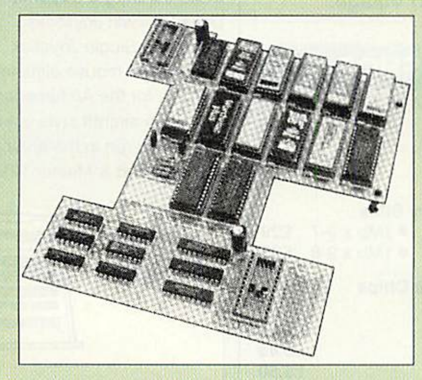
Simply plug the ribbon cable plug into the 6502 socket and gain a massive 32K of extra RAM.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28K bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

Only £49

Solderless Sideways ROM Socket Board



- Increases your BBC Micro's ROM capacity from 4 to 16.
- **No soldering required.**
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish" allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32

Battery Backup fitted **£35**

Battery Backup only **£3**

16K Sideways RAM **£8**

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

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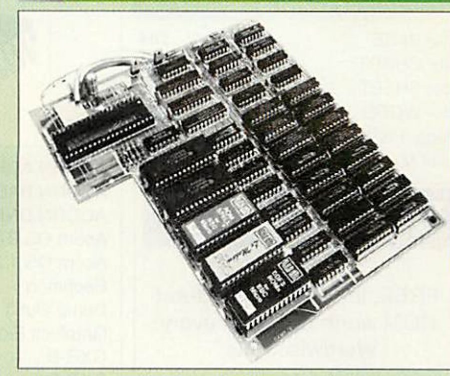
Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK £8

ROM/RAM Card



- No Soldering required to fit the board.
- Compatible with BBC B
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).

PRICES:
- ROM/RAM card with 32k DRAM £39
- ROM/RAM card with 64k DRAM £52
- ROM/RAM card with 128k DRAM £83

OPTIONAL EXTRAS:
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- 16k DRAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches £2 each

Complete ROM-RAM card with all options fitted £99

ROM Cartridges for the BBC Master

Will accept the larger Piggy Back ROMs like Interword, Quest, etc.

• Twin £9; • Quad £14





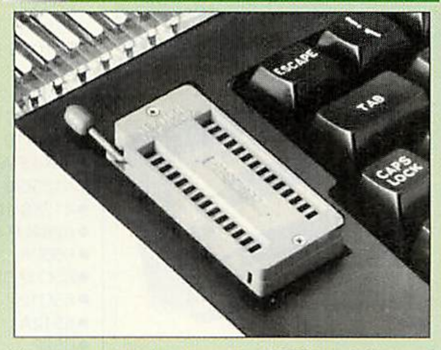


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Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without having to open the lid. The ZIF socket is located into the ROM Cartridge's position. It is very simple to install. No soldering required. Also included in the price is a plastic see through storage case with antistatic lining, which allows you to store 12 ROMs.

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Leasing finance now available at very attractive rates to Businesses (subject to status), Education establishments, Government Depts. and Local Councils. Min. £1000. Please telephone for details.

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Inter SHEET	£37
Inter WORD	£36
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Spell Master	£42

Wordwise plus

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FREE, the superb Word-Aid ROM worth £24, with every Wordwise Plus.

Word-Aid

This advance utilities ROM extends the power of your Wordwise plus ROM.

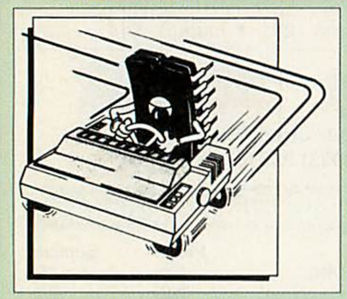
Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
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Viewstore	£36
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View-Index	£12

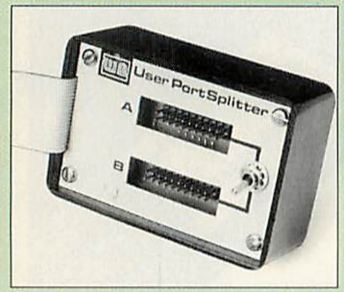
View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

Price: Only £29

User Port Splitter Unit



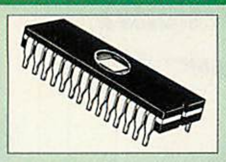
Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows you to connect two devices simultaneously to the BBC's user port.

Excellent Value at £22



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Various Chips

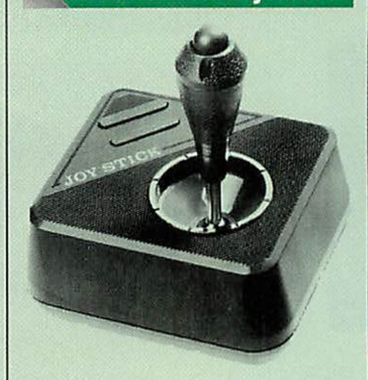
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Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

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Commander Joystick



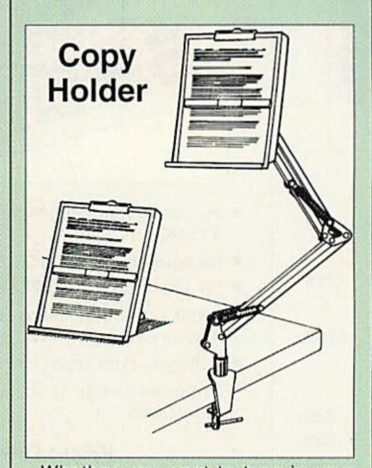
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Adder EPROM Programs 2764 and 27128 EPROMs for the BBC and BBC Master. Connects to the User port.

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Although Acorn machines (such as the BBC B, the Master, the Archimedes) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quickly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

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(Now reads Archimedes Discs)

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Price: £39

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So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

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ABSOLUTE BEGINNERS

Gavin Burns explains how you can get your machine off to a good start

Suddenly you feel inspired; you know the most brilliant and impressive conclusion for that all-important document due in tomorrow. With great speed, you dash to your computer, turn it on and frantically search for the directory that the document is stored in and begin to type.

A message flashes up before you to say that no word processing application has been installed. You can't write a single word yet. Desperately you load the word processor, relocate the document and . . . well, you've forgotten what you wanted to write now.

Wouldn't your life be easier if everything that you used regularly was automatically loaded, every time you switched on your machine? Well, you can tailor your computer to suit your every need, and here's how to do it . . .

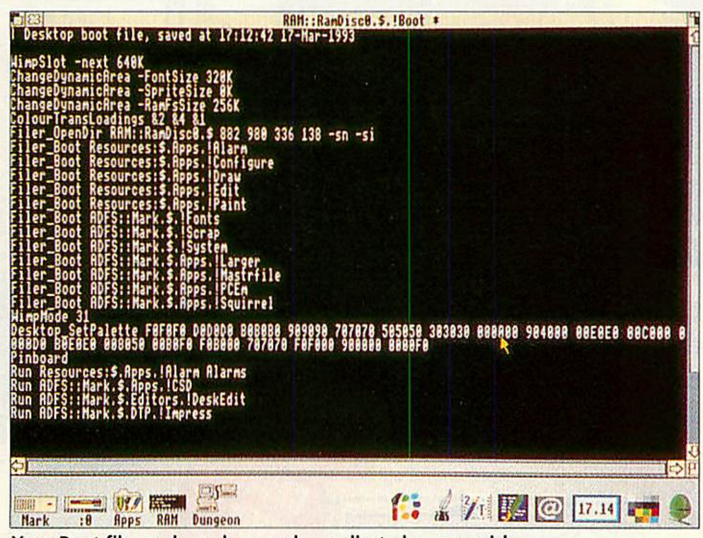
The anatomy or make-up of your machine is stored in a Boot file, a special kind of file that will remember how your machine is set up. Every time you switch on the machine, it's restored exactly as you like it, assuming you've ordered the Boot file to do so.

A Boot file is basically a file containing lots of commands that describe your computer's set up. This file is stored on your disc, and is run when the machine is switched on or reset: this is called booting your machine.

It's simple to set up a Boot file; here's what to do . . .

● Turn on your machine and load up all your favourite bits; a wordprocessing application would be a good idea or, perhaps, you'd find it useful to have a database, like *Squirrel*, already loaded.

● Click the Menu button over the Acorn on the bottom right-hand side of the screen. Go into Desktop boot and drag the file icon on to your hard disc or, if you don't have a hard drive, on to a floppy disc (which will now be called your Boot disc). Make sure that the autoboot option is on (meaning the little star is present). You've now saved your Boot file. It's that simple.



Your Boot file can be as long and complicated as you wish

● Unfortunately, if you have Risc OS 3.10 (check by clicking Menu over the Acorn on your icon bar and looking at the Info line) there is a little bug which prevents things working as they should. To get round this, press F12 and type the following:

*Configure FileSystem ADFS
*ADFS

If your Boot file is on a hard disc, then you should type:

*Configure Drive 4
*Mount 4

If your Boot file is on a floppy disc, then type:

*Configure Drive 0
*Mount 0

Finally, type:

*Opt 4 2
*Configure Boot

Now your Boot disc is set up. If you perform a SHIFT-BREAK, or turn the machine on, then your Boot file will be run. If you have a floppy system, don't forget to put your Boot disc in the drive. You can alter the effects of your Boot file if you want. To do this, simply drag the Boot file into *Edit*, and a bunch of lines will be appear as shown above. If you're particularly clever, you can change the set-up of your machine by altering the commands in these lines.

Take a look at the first part; you'll see something about WimpSlot and ChangeDynamicArea. Nothing to do with a special space for puny bodies, this area is concerned with memory management. The sizes of the font cache and Ram disc are set up here. If you ever need to alter these details permanently, it's better to use the *Configure* application, rather than mess about changing the commands.

Next is the ColourTransLoadings command. This concerns your palette. Ignore it.

As you will of course remember, you needed to have a Filer window open in which to save the Boot file. Filer_OpenDir contains details of this window, but you probably don't really want this window opened every time the computer is turned on. To prevent the window turning up every time, simply delete this line – but only this line – and resave your Boot file.

Next, you should be able to see a large section of commands that all look the same(ish). These begin with Filer_Boot and often make up the bulk of the file, telling the computer which applications or resources to automatically recognise. The full pathname is given, so the computer knows exactly where to find each application. This tells the computer how to load certain files so, for example, the line Filer_Boot Resources:$.Apps.!Draw will make sure that when you double-click on a *Draw* file, then *Draw* is loaded automatically.

Another wimpy bit follows. Here the mode and palette for the desktop are set up. You will see lots of numbers in the Desktop_SetPalette line. If you're curious as to which number corresponds to which colour, look at the palette icon on the bottom right-hand side of the screen; it's the pretty box with coloured squares in it. The first number is the first coloured square on the top left-hand side of the box, the second colour is the second square and so on. Your palette will probably begin with a white square which will have the value F0F0F0.

Next up is the pinboard, the top bit of the desktop which provides a background to the windows. This be completely dull and grey, but the more confident computer users among you will no doubt use some manic chaos pattern.

Finally, you will come across some lines that begin Run. These are the applications you are running at this very moment, and the Run command simply makes sure they will appear on your icon bar when you switch on.

So, if you want to be a more efficient computer user, give your machine a boot.

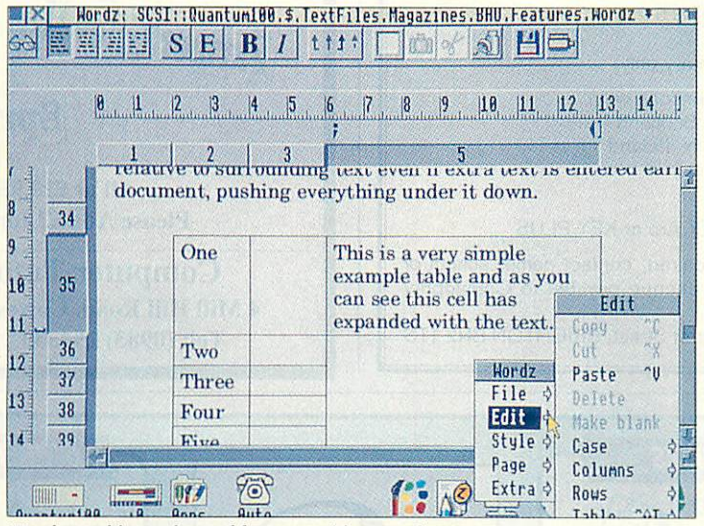
WORDZ MADE EASY

As Ian Burley finds out, Colton's Wordz can be both powerful and easy to use

In the January issue of *Acorn User* I decided that the early pre-release version of *Wordz* was full of promise, if a little slow. I've now had a chance to try out the second update (version 1.02) of the full release version.

With *Pipedream*, Colton Software has long survived on the principle of cramming as much functionality as possible into a single application. Although at heart it was really a spreadsheet, *Pipedream* could justifiably claim to be a word processor and even a simple database.

By contrast, *Wordz* represents a total rethink. It is a word processor, both in name and in nature, and you will have to buy several separate applications to approach the versatility of *Pipedream*. The new Colton Software family includes *Wordz* itself, the forthcoming *Resultz* spreadsheet and an as-yet unnamed database. Let's hope they don't call it *Databaze*.



Wordz combines a host of features with ease of use

NICE AND EASY

Wordz has a bar at the top of the editing window with iconised buttons providing direct access to central functions like text justification modes, style and effect choices, cut/paste, document saving and printing. The very first button contains a pair of spectacles. Click on this and you get the View control dialogue box. This lets you set things like the scale view, the printable area and choose options such as vertical and horizontal rulers or column and row borders.

You can also split the editing area vertically or horizontally into two separate windows on the same document. These remain contained within the single overall *Wordz* window and make editing more manageable. Underneath the button bar is a single status line which doubles as context-sensitive help.

Like Computer Concepts' *Impression*, *Wordz* implements layered styles which can be applied to any selected region of text rather than just all the text in one paragraph. Any text region, be it a single character or an entire document, can have a different customised combination of font, size, foreground or background colour, ruler setting, line spacing or whatever is applied to it. Styles can be masked by more recently applied ones, so complex but impressive combinations of effects can be built up.

Once you have used layered styles it's very difficult to return to the restrictions of the old fashioned paragraph styles. However, it can be difficult to keep track of applied styles, so a style region function has been included, that shows you where the styles are and lets you rearrange them.

ON THE TABLE

Wordz has a very powerful and easy to use table editor. By selecting column and row borders you can drag about the table dimensions of all, or part of, the table to your heart's content. Or you can resize an individual table entry by dragging the sides of its box.

You have the choice of showing or hiding boxes in finished tables. Data entered can be made to flow from one line to another within its column bounds and automatically extend the cell.

Rows and columns are easily inserted, selected and deleted. Pre-prepared data can be directly imported into a table if it is in CSV format. All you need to do is drag and drop the CSV file icon into your *Wordz* document and a the program automatically generates a table.

When *Resultz* arrives you will be able to insert whole spreadsheets into *Wordz* tables. As *Wordz* and *Resultz* will share a dynamic link you will be able to edit *Resultz* sheets from within *Wordz* as long as both applications are running at the same time. *Wordz* will also share *Resultz*-generated charts and these too will be updated in real time.

Wordz documents can incorporate either *Paint* or *Draw* images, but not those from *Artworks*. Images can either be imported into the *Wordz* document file, meaning the image must be copied, or to save space, *Wordz* can reference external image files.

Illustrations can be resized and moved around the document and there is an option to use an image as a page backdrop. Images can be pinned so they maintain their position relative to surrounding text.

AND THE REST

Other *Wordz* niceties include templates for label printing, a 58,000-word spelling checker with user-dictionary option, fields for fixed dates or today's date, case swapping, word counting on selected regions as well as the entire document and the ability to import *First Word Plus* files.

Wordz is certainly an impressive package to use. Nothing is ever 100 percent perfect and I have some quibbles: although speeded up since its pre-release days, *Wordz* is still a bit sluggish at times when forcing the text to scroll with the arrow keys and there is an annoying screen repaint every now and again, which seems unnecessary.

There is no option for click-selecting a single line with the mouse; two clicks selects a word and three the whole paragraph. I was disappointed that drag and drop editing to supplement the conventional cut-copy-paste method had not been implemented. Colton Software has not ruled these options out, but has no definite plans either. Advanced features like footnotes, indexing and outlining are also not on the priorities list.

Nevertheless, the arrival of *Wordz* has already stirred some of Colton Software's rivals into action to improve their own wares. *Wordz* looks nice, is genuinely easy to use, has powerful features like layered styles and comprehensive tabling and promises a lot, with hot links to *Resultz* and the forthcoming database.

PRODUCT DETAILS

Product: Wordz
Supplier: Colton Software, 2 Signet Court, Swanns Road, Cambridge, CB5 8LA
Tel: (0223) 311881
Price: £99



FANFARE FOR THE COMMON MIDI

Richard Garrett plays along with Serenade, Clares' new Midi package

The trouble with Midi sequencers is that most of them are written for pro musicians who, as everyone knows, speak a foreign language – riff, hook, stab, middle eight and so on – read hieroglyphics – musical notation – sleep during the daytime and have egos bigger than the Albert Hall. Any piece of software that meets their approval must cost loads of money, be totally unintelligible to the average punter and do everything they ever wanted, including mix Alka-Seltzer when appropriate. If you don't fit the above description then read on.

ENTER SERENADE

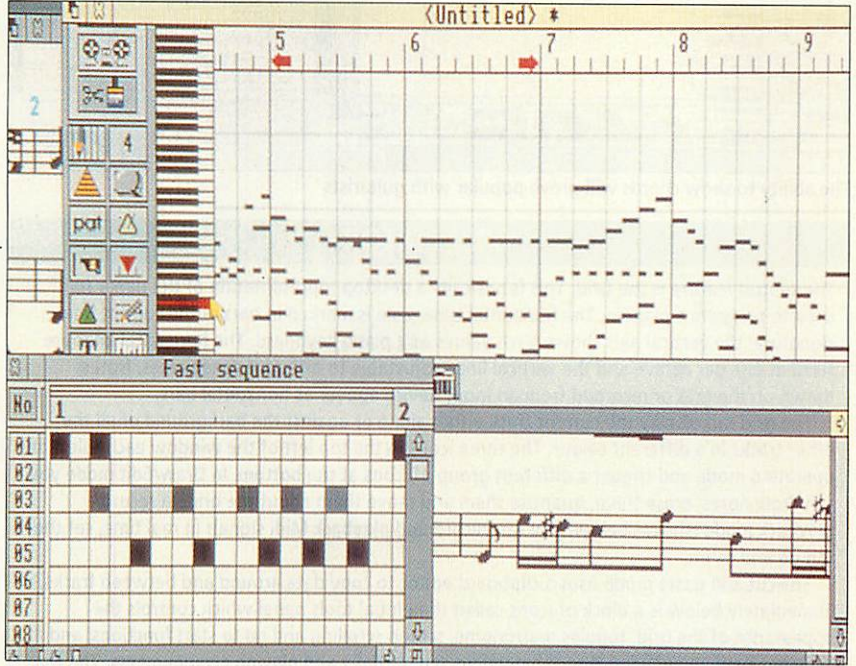
Serenade is an unashamedly entry level Midi sequencer that can write and arrange music for up to 16 electronic instruments. It is a grid edit sequencer which runs in the desktop and uses the analogy of a player piano to represent musical notes as lines on a paper roll rather than dots on a stave.

Clares has used icons extensively in the layout and, unlike many sequencers, it offers a huge number of specialist functions without seriously constricting the user's workspace. This is exclusively a Midi package, and will only work with an appropriate interface card. Since such packages are still rare on the Arc, it's worth describing the function of *Serenade* in a little detail . . .

Sequencers are programs that help you compose music on screen, record it from a synthesizer keyboard or other input device and play it back using external tone generators (the synth again). This is achieved by passing information between the computer and processor driven musical instruments over five-pin DIN cables.

Unlike sound sampling programs, Midi sequencers never deal in actual sound, but manipulate control signals (the outputs) that tell synthesizers and drum machines what sounds to generate from their own hardware. The system also transmits controller information (inputs) which describes the status of volume knobs, expression pedals, pitch wheels and other modulation devices.

Although Midi addresses instruments on 16 different channels at once, you don't need to connect your computer to 16 boxes. Contemporary multi-timbral synths can generate about 24 notes at once spread over 16 stereo instruments or voices: all from one £300 bit of



If it looks like a pianola roll, that's because it works much the same way

TRACK SHEET

This is one of the most important windows in the package. It contains a list of the 16 internal tracks – eight visible at once – with writable track names and flags indicating Mute, Solo, Record enable and Lock status. Mute stops a channel from sending data to the tone generator thereby silencing it. Solo is its extreme opposite. When you select it, all other channels are muted so that the track plays alone. Record enable allows you to record signals from a Midi input devices on that particular track and Lock prevents the track from recording.

By selecting and dragging a track name around, you can produce duplicate copies of it, merge it with another track or delete it. When you select a track number from the list, the window will also display its parameters. These are the number of its Midi port, its channel and the name and number of the instrument (voice, program) selected. The list of instruments can be configured to your synth using *Edit*.

Track Sheet

No.	M	S	Track Name	R	L
1					
2			ContraBs		
3			Strings		
4			Violin		
5			Violin		
6			Violin		
7			Strings		
8					

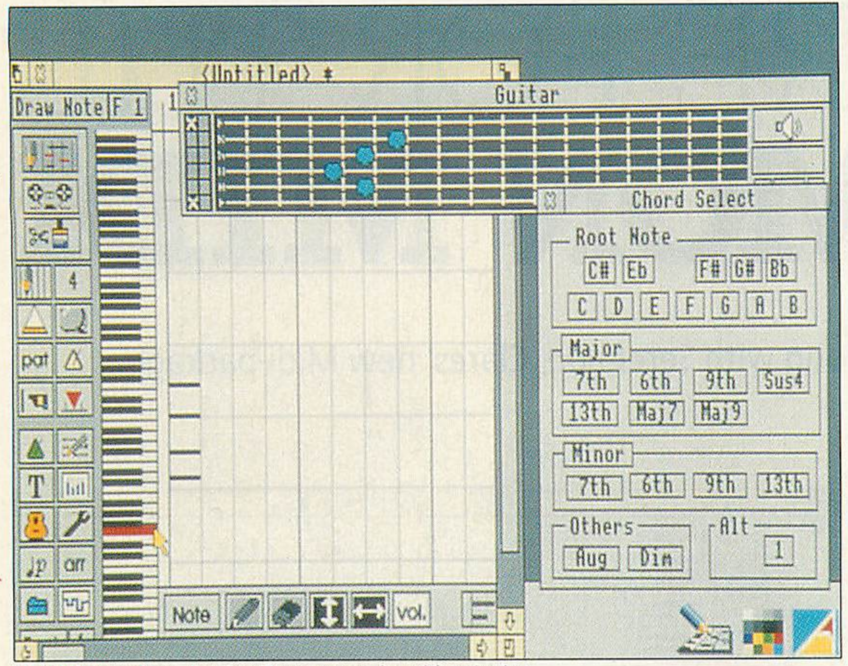
Parameters	
Quantize	OFF
Transpose	OFF
Channel	3
Port	1
Instrument	41
sereneOrch	

N Pb At C Pc

Midi Channels

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

demix



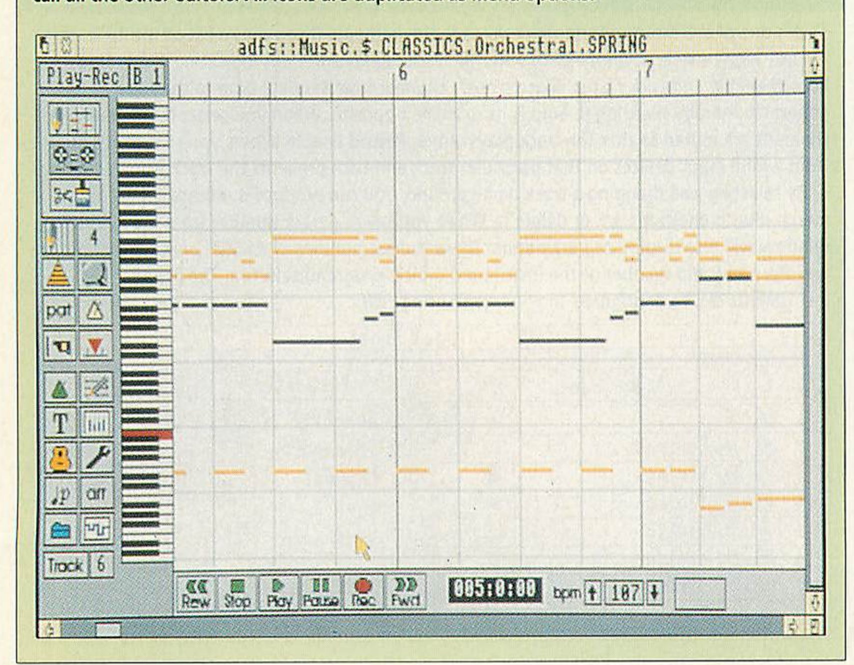
The ability to show chords will prove popular with guitarists

GRID EDITOR

The central feature is the Grid. This is basically a desktop representation of the paper roll used to program a pianola. The horizontal time scale is marked in bars at the current time signature; the vertical axis shows pitch values as a piano keyboard. The horizontal lines are fixed at one per octave and the vertical lines adjustable to different note values. Notes drawn on the grid or recorded from an input device appear as horizontal bars.

The grid can display the current track either alone or against the background of all the other tracks in a different colour. The three icons in the top left of the window each select an operating mode and trigger a different group of icons at the bottom. In Draw/Edit mode you can draw notes, erase them, quantise them and move them about the grid. In record/playback mode (shown below) you can record and playback Midi signals in real time, set the tempo and so on.

The cut and paste mode uses a clipboard editor to copy data around and between tracks. Immediately below is a block of icons called the global tools panel which controls the appearance of the grid; toggles metronome, screen scrolling and go to start functions; and switches between playing through patterns sequentially and playing arrangements. The ten icons at the bottom left of the screen make up the Function panel from which you can set up the metronome, set the time signature, add and remove bars from the grid, save files, and call all the other editors. All icons are duplicated as menu options.



hardware. *Serenade* offers the user two methods of writing music. In Draw/Edit mode, you write notes of fixed duration and loudness (velocity) on to the grid using a pencil icon.

The length and velocity of these notes can be altered much as you would select nib shapes and sizes in an art package. Like conventional drawing packages, it also provides the normal complement of snap to grid, edit and move (transpose) functions.

QUANTISE THEORY

One feature with no obvious counterpart in drawing packages is known as quantisation. This corrects playing errors by detecting notes that occur ahead of or behind the beat and automatically moving them to the right place (one person's playing error is another's expression). In *Serenade*, the quantise function can be altered so that notes move all or part way towards the nearest grid line allowing you to tighten up your playing without making it totally mechanical.

In Record/Play mode, you can enter notes from a synth in real time with their durations and velocities dependant on how you hit the keys. To help with this, the program provides a click track whose pitch, volume and Midi channel can be set from the icon bar. This metronome gives a non-configurable one bar count before the start of the track. If you want to 'drop in' to an existing track and fix an error, you can set the record option to remain inactive until it receives a Midi keypress. There is also an editable tempo track which guides the speed of you tune as it plays.

Having created a number of 16-part phrases, you can build a song structure from the arrange window. This is a list of sections defined by bar numbers which can be repeated and played in order using an arrange play option from the global tools menu. It's great for rock musicians for whom life would not be the same without verse-verse-chorus-verse-chorus-chorus-stop but is rather less useful for those musicians of a classical bent.

If you're a guitarist, one feature that you'll really like is the guitar chord window. When you click on the guitar icon, a window opens to display a 17-fret guitar fingerboard and, by selecting frets with the mouse pointer to indicate where you would put your fingers, you can build chords without knowing exactly what they're called.

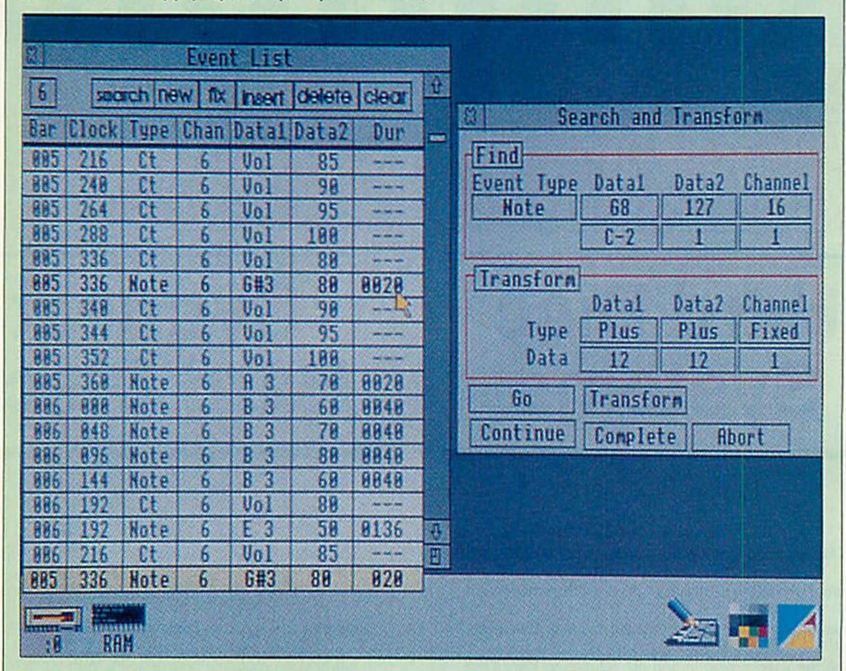
Alternatively, you can use a chord select box to choose common chords by name in up to three voicings. When you hit the loudspeaker icon, *Serenade* strums the notes in a style reminiscent of a seriously depressed flamenco player but it's sufficient to get the idea. With the main screen in Draw/Edit mode, you can write the chord into your current track.

VARIETY ACT

The variety of musical phenomena is such that no one editor adequately displays them all. Standard musical notation is great for showing harmonic relationships, chords and so on but lacks the precision of the grid when describing durations and start times. Neither is as detailed as an event editor and all three are appalling at illustrating drum patterns. Because of this, many

EVENT LIST

If you're a *Tracker* user moving up to Midi, this is the screen that you will find most familiar. All the data in the current track appears as columns of numbers in a scrolling window in which each row holds an event. Events are either notes defined in terms of channel, pitch, volume and duration, or Midi control instructions (these cover such aspects of the process as pitch bend, program change, modulation wheel, pan, volume). Each event occurs at a point in time shown by its bar number and a clock value within the bar. There are 384 clock values in each bar, so one crochet is equal to 92 clock pulses. Technically, this is referred to as a resolution of 92 ppqn (pulses per quarter note).



When you click on a row, the event data is copied into an edit line at the bottom of the window. From here, you can delete it or, once you've made any necessary changes, you can replace (fix) the original or insert it as an additional event. From the event list, you can also call up a Search and Transform option. This is much like the search and replace feature in a word processor, except that it searches for events of a particular type that fall within a given range of values and then transforms all of them by adding, subtracting or randomising data. For example, if you were to locate all notes on channel 3 and add 12 to their pitch values this would transpose the whole track up one octave.

OTHER MACHINES AND OTHER PACKAGES

Although software Midi sequencing has been around for several years, it has until recently been limited, almost exclusively, to packages designed for the Atari ST (for poor musos) and the Apple Macintosh (seen in flash studios only). The market leaders in the field have been £400 plus: products like *EMagic Notator* on the ST, *Opcode Vision* on the Macintosh and *Steinberg Cubase* on both.

During that time, the price of Midi hardware has been such that composing on computer has been a hobby limited to wealthy and/or committed enthusiasts. This means that most software has been aimed at a musically knowledgeable bunch of users who've wanted more and more features and have been prepared to put a lot of time into discovering the operational eccentricities of 'pro packages'.

These days, most of these manufacturers have tidied up the front end of their wares and produced cut down versions (*EZ Vision, Cubase Lite, Notator Alpha*) for the home market. All these packages fall in the £100-£200 price range and are distinguished from their 'pro' siblings by the absence of features like synchronisation to tape and video recorders and the more sophisticated quantisation and editor options.

Serenade alone falls firmly within this group and, combined with *Rhythm-Bed* and *Rhapsody*, would give any of the software packages based on other platforms a run for their money. Unlike many people in the Acorn world I don't generally go in for extolling the virtues of fast processing speeds, which can often be meaningless in themselves, but *Serenade* has a smoothness of operation when writing notes by hand that I've only encountered using *Cubase* on the faster 68030-based Macintoshs. In the Risc OS 3 environment, the only competition for this package is EMR's Studio 24+ version 3, which is a bit more expensive but has a few more 'professional end' features.

sequencers feature drum pattern and notation editors. As Clares already has notation and drum editors in its catalogue, these features have been left out but hooks into these products have been included.

If you have version 1.26 or later of *Rhythm-Bed*, you can synchronise it with *Serenade* so that when you hit the play button on the main screen, your drum patterns will roll along in time. Currently, this only works if the tempo is fixed throughout the piece. Like many drummers, version 1.26 can't handle changing speed in mid-song.

For users of *Rhapsody*, and of most Midi software for that matter, Clares has taken the bold step of storing sequences as type one Standard Midi Files. SMFs can be loaded straight into *Rhapsody* and converted into musical notation but, as existing users will know, this is time consuming operation. In practice it's likely that one would only notate completed arrangements rather than swap continuously between the stave and the piano roll.

Clares should be congratulated for this modular approach to software design. It means that users who don't like drum machines or don't want to use standard notation don't have to buy that element of the total package. It also keeps the price down.

CADENZA

Although it is presented as an entry level product, *Serenade* offers a depth and flexibility that are normally associated with professional sequencers. However it has not become cluttered or overly complex. The icons and advice boxes are clear, and writing notes on the grid is very smooth.

Personally, I would like to see the screen layout rationalised a little so that I didn't have to change modes so often. Perhaps the tape and edit controls could have been on the main bar and the cut and paste functions could be left in the menu.

When used in conjunction with *Rhythm-Bed* and *Rhapsody*, it provides a comprehensive working environment for the Midi musician and only falls short of professional requirements in one or two points – notably the inability to change time signature in mid track and the lack of tape synchronisation.

Clares says that it still has many enhancements to the system planned and I'm looking forward to them already. If you are an Archimedes user thinking of getting into Midi music, or just a musician looking for a good first sequencer, then I suggest you take a look at *Serenade*. At the asking price, we are talking serious business.

PRODUCT DETAILS

Product: Serenade
Supplier: Clares Micro Supplies, 98 Middlewich Road, Northwich, Cheshire, CW9 7DA
Tel: (0606) 485111
Price: £135 inc VAT

Rhythm Bed (£49.95) and Rhapsody (£61.95) are also supplied by Clares

SCSI systems The complete

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Our CD ROM systems comprise of a Toshiba mechanism (Multisession - Photo CD compatible), a Morley SCSI card, a set of stereo speakers and four collections of discs to choose from (see below). The software on these discs is all RISC OS software and requires no use of a PC emulator whatsoever.

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Collection 2	£729.00
(Grooves, Creepy Crawlies, Image Warehouse and Hutchinsons Encyclopedia)	
Collection 3	£769.00
(Grooves, Creepy Crawlies, Image Warehouse and Dictionary of the living world)	
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(Grooves, Creepy Crawlies, Image Warehouse, Hutchinsons Encyclopedia and Dictionary of the living world)	
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A300/400/5000 Internal 80Mb	£449.00
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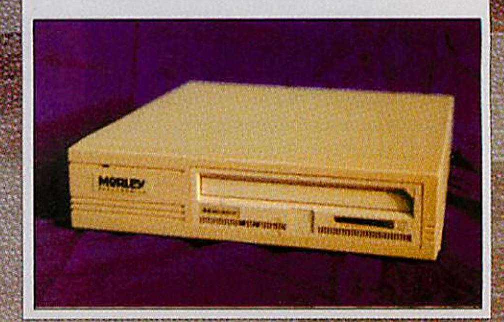


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42Mb system	£499.00
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(Both include SCSI Interface & one cartridge)	
Consumables	
42Mb Cartridges	£65.00
88Mb Cartridges	£109.00



from Morley. solution.

Tape Archive

Tape archive systems tend to be regarded as expensive add ons to an Acorn system. The part that people tend to forget about is how valuable is their data? If you manage a network just think how much time and cost would be wasted if the hard disc failed without you having a recent back-up. Using standard floppy discs for back-up is one option but is incredibly tedious if large amounts of data are invloved.

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(Includes SCSI Interface & one 250Mb tape)	

Consumables

250Mb Tapes	£24.99
150Mb Tapes	£19.99



Floptical® Systems

The new Floptical® system has been developed in the USA by Insite Peripherals of California while the drives are being manufactured by Matsushita of Japan (one of the worlds largest electronic manufacturers). 3M and Hitachi are currently producing the special 21Mb discs which give this incredible amount of storage. Morley have developed the drive for use on the Acorn range of RISC OS computers and this can now read and write standard 800k and 1.6Mb floppies as well as the 21Mb Floptical® discs. Using the 21Mb discs these drives are approximately twice as fast as normal floppy drives making them perfect for use as a backup system or general purpose program/data storage.

External 21Mb system	£499.00
A5000 internal 21Mb system	£425.00
(Both include SCSI Interface & one disc)	

Consumables

21Mb disc each	£24.00
Pack of 5 x 21Mb discs	£99.00



Other Prices

RISC OS CD ROM DISCS

Creepy Crawlies (MDI)	£99.00
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Image Warehouse (MDI)	£59.00
Dictionary Of The Living World (MDI)	£175.00
Hutchinsons Encyclopedia (PEP)	£99.00
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Frontier 2000 (CSH)	£175.00
Revelation 2 (Longman Logotron)	£139.00
British Birds (ILP)	£150.00

Other Products

Morley Analogue & User I/F	£59.00
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Please note that all prices exclude VAT and carriage. E & OE

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MODEM TIMES

Ian Burley hacks a path through the communications jungle

It's almost two years since our last feature on comms. Then, the fastest widely available modems operated at 9,600bps (bits per second). That means such a modem can transmit or receive around 1000 characters per second, meaning data files could be shifted to or from your Archimedes over the phone line at about 70K per minute. This didn't come cheap and the most affordable 9,600bps modem then was at least £500.

Today, for as little as £250, you can buy modems which go 50 percent faster and have much better data compression system, meaning lower phone bills. Even if the princely sum of £250 still makes your wallet cringe, you have the more affordable option of going for slower 2,400bps (V22bis standard) modems but these have been enhanced by better data compression systems too.

Finally, since the introduction of *ArcFax* from Dave Pilling, who can be contacted on (0253) 852806, there's the added attraction of sending and receiving faxes.

Undoubtedly, if you are looking for a new modem the best performance standard to aim for these days is V32bis. This manages data transfers at the rate of 14,400bps, 50 percent faster than 9,600bps V32 modems. Even if your phone line isn't the clearest, V32bis is designed to detect this and can automatically step down to a slower but more reliable speed such as 1,200bps.

A point to note is that to fully exploit the V32bis performance, you need to connect your modem to the serial port at a speed of at least 38.4Kbps; otherwise when downloading uncompressed files, your modem will function more quickly than your serial port. The snag is that Risc OS only supports a maximum speed of 19.2K bps but third party serial port interfaces like The Serial Port's new High Performance Dual Serial Card can fix this.

COMPRESSION

V42bis is a modem data compression standard which is steadily replacing the more familiar MNP5 standard, with which it remains compatible.

V42bis is nice, because its compression algorithm is more efficient and it can work out whether or not data compression is desirable during a file transfer. This is important because a modem can slow down as it tries to compress an already compressed stream of data. Unlike MNP5, V42bis doesn't make this mistake.

FAX

Many modern modems now offer fax machine compatibility. Currently, only David Pilling's *ArcFax* package enables you to do this on an Arc but it's effective and very affordable.

When choosing a modem with fax compatibility, make sure it has both fax send and receive functions – earlier models tended to offer only a fax sender – and check it has 9,600bps transfer rates or higher. Most up to date 2,400bps modems can operate in fax mode at 9,600bps. *ArcFax* currently only supports Class 2 fax modems, though David Pilling is working on a Class 1 driver.

THE BUYER

In summary, if you are in the market for a new modem, its ideal specification would include 14,400bps V32bis performance and V42bis data compression combined with Class 2 fax compatibility. BABT-approved modems with this specification, like the new Pace Linnet 32 Plus, for example, can be bought for below £400+VAT and, if you really want to economise, you can go for a non-approved import like the Twincom 144DF for around £250+VAT.

Remember, it's technically illegal to use unapproved modems in the UK. Even if you're going for a less expensive but slower 2,400bps modem, I'd strongly suggest you go for one which features V42bis and fax. Approved models are available for as little as £150+VAT, unapproved for under £100.

Here we look at a sample of four modems: two portables and two desktops.

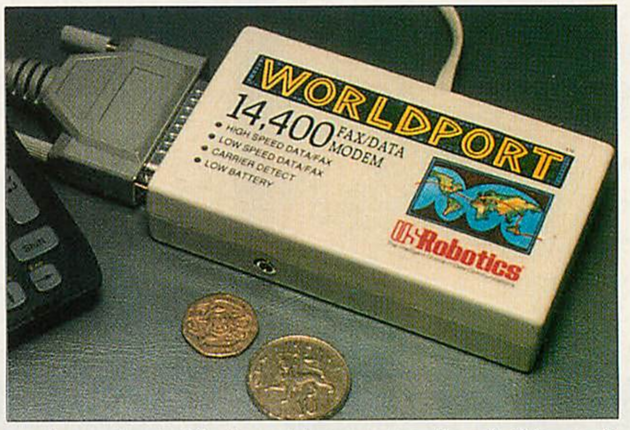
WORLDPORT 14,400

US Robotics
Tel: (0753) 811180
Price: £499 + VAT

Since its acquisition over a year ago by US Robotics, the WorldPort pocket modem range has been extensively revamped. Top of the range is the 14,400 Fax/Data model. It's no longer the smallest pocket modem around, but I don't know of many others which pack more punch into such a small box. It offers 14,400bps V32bis connections, V42bis smart data compression and fax.

It's sad that, especially for Archimedes users, US Robotics hasn't yet adopted the Class 2 fax standard. Until David Pilling brings out his Class 1 driver for *ArcFax*, you won't be able to use this WorldPort as a fax modem on an Archimedes.

A very compact 9V mains transformer is supplied as are a pair of 9V PP3 alkaline batteries. Each of the latter will last between 90 minutes and two hours; not much, so really only useful as an emergency backup. The third option is via pin nine on the modem's 25-pin serial connector, though this won't work with the Archimedes' nine-pin serial port. Overall, a very desirable pocketful of modem power.



Likes: Compact but powerful
Dislikes: No Class 2 fax compatibility

TWINCOM 144DF

Twincom
Tel: (0101) 201 935 4699
Price: £250+VAT

The Twincom 144DF is a popular, high specification fax and data modem imported by a variety of UK wholesalers from the US. However, it is not BABT-approved for the UK, but you get V32bis, V42bis, Class 1 and 2 Fax compatibility and a generous array of status LEDs on the front panel of a plain black slimline case.

This particular modem was the subject of considerable debate on bulletin boards when it was first introduced. The Twincom 144DF has attracted less negative attention though the general consensus is that it's best to have version 1.27 or later of the modem's firmware for trouble-free comms. This can be revealed by issuing the Hayes modem command ATI3. Indeed, later versions of the Supra seem to be much improved as well. Of all the cheap non-approved imports, the Twincom is one of the better ones.



The Serial Port offers this modem in a bundle which includes *ARCterm 7*, *ArcFax* and an Archimedes modem lead for £350+VAT. For more details contact them on (0749) 670809.
Likes: Good specification, great value
Dislikes: No BABT approval

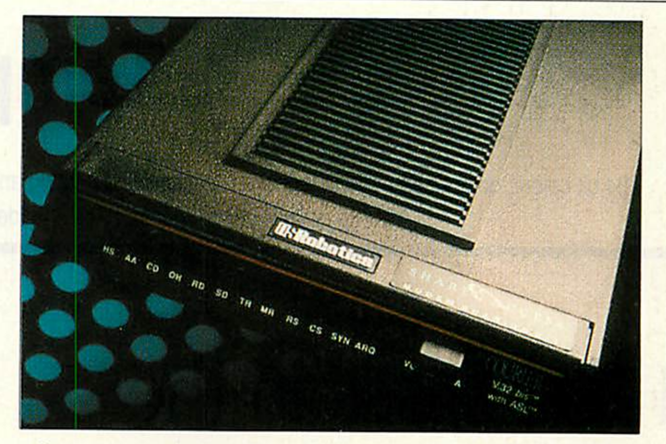
COURIER V32BIS

US Robotics
Tel: (0753) 811180
Price: £595+VAT

Steady development plus good marketing has endowed the Courier range with a great deal of respect. Although they aren't the cheapest, Couriers are one of the most popular modems among bulletin board operators.

For 1993 the Courier range has a more compact case and Class 1 Fax compatibility. Couriers are also future-proof, since it will also be possible to upgrade the latest versions to the Vfast standard when it becomes available later this year. Vfast doubles the speed of V32bis.

Some models in the Courier range retain the option of US Robotics' long-standing proprietary HST (High Speed Transfer) protocol. This endowed HST users with 9,600 and 14,400bps speeds before the respective 'official' V32 and V32bis protocols became available. HST has been further tweaked to 16,800bps, but this speed will only be available



when connected to another, similarly equipped, Courier. If the phone line isn't perfect, another proprietary feature called ASL enables a pair of Couriers to optimise their connection settings.
Likes: ASL, it's future-proof and dependable
Dislikes: No Class 2 fax compatibility

MICROLIN FX

Pace
Tel: (0274) 532000
Price: £299+VAT

The MicroLin FX is a gem of pocket modem from Pace. For a fully BABT-approved 2400bps modem it is set at a competitive price, many dealers advertising it for £199+VAT. David Pilling has bundled *ArcFax* and Beebug's *Hearsay 2* comms package with a Microlin for £264+VAT. The Serial Port does a similar deal but swapping *Hearsay 2* for *ARCterm 7*.

Unusually, the Microlin's specification includes the MNP level 10 protocol for optimised transmissions over poor quality phone lines; a worthy feature especially for those who travel a lot or use a cellular phone line. Once again, as with the WorldPort, the Microlin can be switched on and off via the serial port to save its 9V PP3 battery power and a small 9V mains transformer is supplied.

Being a 2,400bps device, the Microlin is the slowest of the modems we have looked at here by a wide margin, but you can



still expect compressed file transfer rates approaching 900cps, equivalent to around 53K a minute and 2,400 is a perfectly acceptable speed for viewdata and other services.
Likes: Nice design, MNP10 for bad lines, good value
Dislikes: Rather slow

IN BRIEF

Kodak CD waits in the wings, ProArtisan 2 promises artistic splendour and Almanac, the first desktop filofax, aims to organise your life . . .

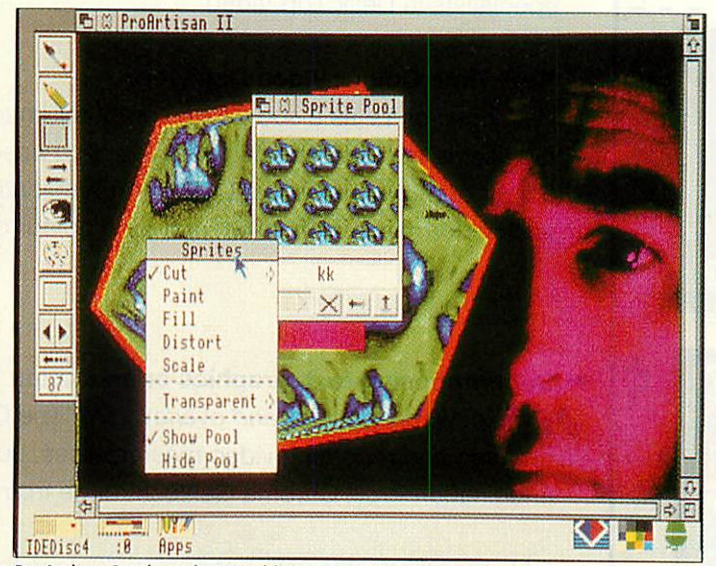
PROARTISAN 2

Clares Micro Supplies
Tel: (0606) 48511
About £135

ProArtisan 2 is a state-of-the art package from Clares Micro Supplies. Don't be fooled by the 2: this is a brand new addition to the *Artisan* family.

The clear screen display is one of the outstanding design features, showing a configurable working space with nine control panels offering a wide range of painting, drawing and image processing possibilities. Selecting the first paintbrush icon and menu reveals 30 functions, including brushes, sprays, fills, crayons, patterns and blends.

Unique texture effects can be applied over images, creating canvas and even concrete screens. There is also a realistic inkpen for calligraphy. The Fill options are comprehensive, offering plain, circular, angled and three-dimensional with interpolated blends. The Pencil icon contains standard geometric shapes with a special 'designer' polygon tool, a text dialogue box and that all-important Grid function, visibly displayed on the screen. Sprites can be cut, painted, filled, scaled, distorted and made transparent. Imported sprites can be easily be dropped into a sprite pool, flipped and reversed then tiled on the main screen, *Draw* files will also be accepted. Where the software really excels is with the powerful Process control panel, where masks can be defined by colour or shape allowing work on selected areas of the screen. This can be used for the accurate cutting out of complex areas from digitised images, simplifying colour values for printmaking or just free abstract art exploration.



ProArtisan 2: a brand new addition to the Artisan family

It is difficult to adequately describe in such a small space all the hidden depths of *ProArtisan 2*. Suffice it to say it, thankfully, appears to bridge the gap between advanced image processing and painting software. I found it intuitively easy to use, and enjoyed the powerful interactive features. Indeed it may be all you will ever need for your art and design requirements. The product is still being developed with a proposed release date for Spring/Summer 93.

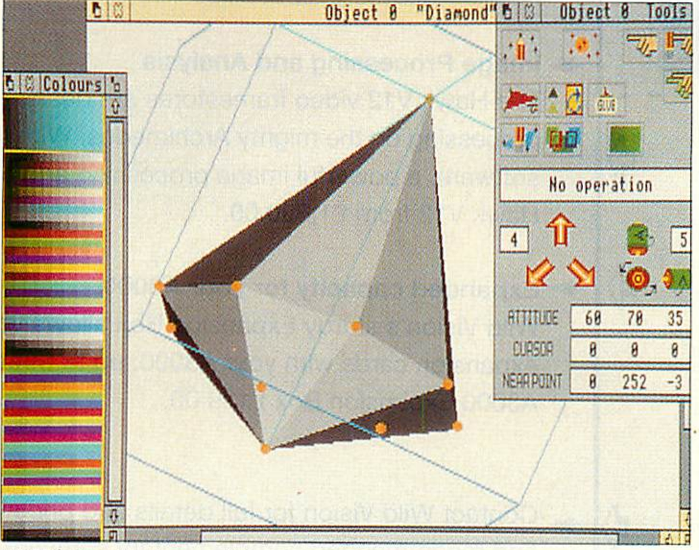
Pete Worrall

COGS

Producer: Android Systems
Tel: (0903) 756443
£70

Android's *COGS* (*Complex Object Generation System)* is a three-dimensional design and animation utility. The system has two main elements, an editor for drawing objects and a group of routines for manipulating them.

In the edit screen you can move around using a three-axis cursor and plot points within a wire frame cube showing the limits and the rotational attitude of your workspace. Once you've plotted a few points you can connect them to form flat triangles or 'trifaces' you can colour to taste and then glue together to make more complex objects. As you do this, you can rotate the whole frame of reference to look at your object from different angles and watch as individual trifaces change shade as they rotate towards and away from you. If you have specific regular shapes in mind, there is also a menu option that generates these in one go.



COGS brings 3D shapes within your grasp

When your object is complete, you can save it either in its 3-D form to be used in your programs or, in sprite form, as a two-dimensional projection to be incorporated into still work, art and DTP applications and so on. It is very easy to produce simple polyhedral shapes but I would be unsure about making more complicated designs. More help from the manual on this subject would be useful.

The second half of the package is a set of seven software interrupt calls for handling *COGS* image files and for displaying, rotating and translating images around the screen. Android says these are for manipulating objects within C and Basic but, since they are SWI calls, I don't see why you shouldn't make them from any language you choose.

Richard Garrett

DESKTOP VIDEO

ON THE MENU TODAY...

Wild Vision

Info

→ High quality expansions for the Archimedes, A5000 and A3000 from the specialists in Desk Top Video.



Real Time Colour Video Digitisers

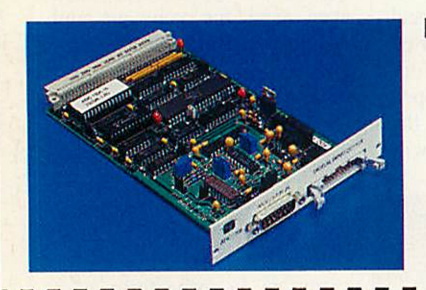
Use video or TV as a source for computer images. The popular Hawk V9 digitiser is the ideal solution wherever you need photograph-like sprites in colour or monochrome for DTP or Art applications. Wild Vision combine quality and performance with value; real-time colour digitisers available from £199.00.



Superimposing text, graphics or animation onto video

Simple, with a *genlock and overlay card*. The Chroma range is your route to creating and recording video masterpieces. Just let the film - and your imagination - roll! Chroma Genlock range from £215.00.

PAL encoding units with optional multiple display facility also available.



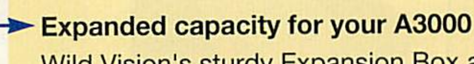
Data acquisition

The Archimedes is the ideal vehicle for the measurement and analysis of analogue signals such as sound or ECG readings. Wild Vision's high speed 12-bit analogue to digital converters are used in medicine, research, defence, and incorporated into turnkey systems. ADC1208 from £560.00.



Image Processing and Analysis

The Hawk V12 video framestores are designed specifically for image processing on the mighty Archimedes. With Foster Findlay's ArcImage software, a powerful image processing and analysis system is created. Hawk V12 from £1,990.00.



Expanded capacity for your A3000

Wild Vision's sturdy Expansion Box allows you to use standard Archimedes expansion cards with your A3000; up to three cards may be fitted at once. A3000 Expansion Box £139.00.

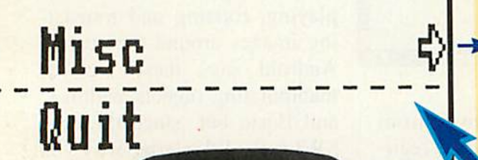
Misc

Contact Wild Vision for full details and price information on the above hardware and recommended complementary software.

Quit

Wild Vision, 15 Witney Way, Boldon Business Park, Boldon Colliery, Tyne & Wear NE35 9PE, Tel: 091 519 1455, Fax: 091 519 1929

Prices exclude carriage and VAT



WILD VISION

TALKING PICTURES

Talking Pictures/The Spoken Word
Wyddfa Software
Tel: (0286) 870101
£20

Talking Pictures is an electronic colouring book with one major difference over the more conventional type: it speaks. The aim of the program is to encourage language development in very young children by helping them to identify both the colours and the names of everyday objects.

Using the mouse, the child can produce bright pictures by selecting colours and objects on an outline stencil. The program's response is inspiring to children; it recites the name of the chosen colour or object.

The program is fully Risc OS compliant and can run in either a scalable window or a fixed window which cannot be accidentally altered. Four stencils are provided on a second disc, each of which invites colouring. Clicking on a colour or object produces a clear, digitally recorded voice with well pronounced words. A rubber is provided although this is really an 'undo' facility, as 'wrong' colours are removed by simply choosing a replacement colour for them.



Talking Pictures gives children a chance to prove their skills

A text box is available for the child to add a word or two or simply enter their name as proof of authorship. Completed pictures can be saved and printed by using *Paint*. A stencil maker program is also provided and, although creating a non-speaking stencil is quite straightforward, the addition of speech complicates things disproportionately, even with a sound sampling system available.

Spoken Word takes the concept a step further by showing the colours together with their written names and the names of the objects in the stencil on a side panel. This time each' object can be selected via its written name and coloured in or, if children find this jump too great, there is an option to revert to *Talking Pictures* mode. In addition to a text box, *The Spoken Word* offers a 'words window' in which the words are presented as spoken, reinforcing the link between spoken and written words. All the other features of *Talking Pictures* are present in *The Spoken Word*.

Talking Pictures is imminently suited for preschool and reception children and those with special educational needs like ESL learners. It does its task well being virtually foolproof; essential for the target audience. *The Spoken Word* will certainly help to deliver English ATs 1 & 2 (level 1) by encouraging understanding of the spoken word and stimulating interest in reading.

I found both these programs ideal media through which to introduce KS 1 children to Acorn A-series computers: each child can quickly create a finished piece of work, printed and mounted with the proud boast it was done with the computer.

Providing children possess the necessary motor skills to use a mouse they should have few problems adapting to these simple yet successful programs. A thoroughly recommended pair of programs.

Chris Drage

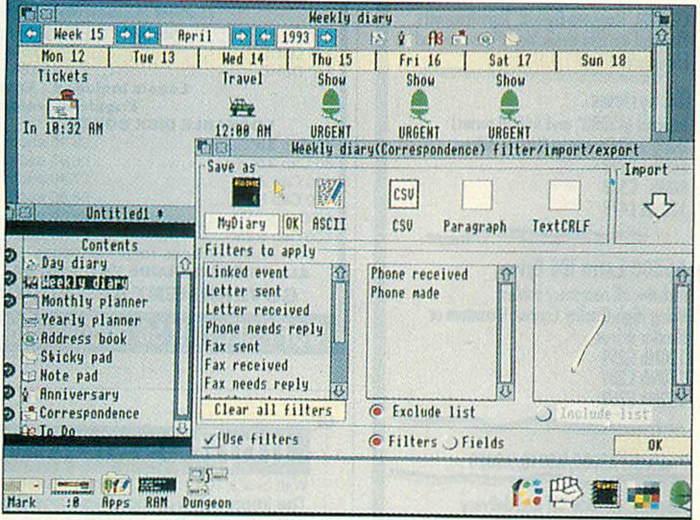
ALMANAC

Stallion Software
Tel: (0225) 483236
£60

You may well have seen computerised personal organisers on a PC, but *Almanac* from Stallion Software is the first Archimedes organiser to hit the streets. The concept is simple: *Almanac* simulates a personal organiser but, of course, has many advantages over the paper-based version.

Almanac even looks like an organiser; its main menu screen has ring binding down the side. This screen provides access to the main sections of the organiser: Diary, Address book, Sticky Pad, Note Pad and Correspondence.

Variations on each theme are available, such as daily, weekly or yearly diaries, anniversary lists, to-do lists and such like. These entries simply provide other ways of looking at the data, so the different diaries actually look at the same database.



Almanac helps you to organise that oh-so-busy life

The power of *Almanac* is in two main areas. The first is that any data in any section can be linked dynamically to any other section, so, for example, if you had a meeting with Sam Smith in your diary, you could link that entry to Sam Smith's address in the address book.

This is a major advantage of the electronic organiser: the sections are mutually dependent, not physically unrelated. Links do not have to be within the organiser either; details of correspondence can also contain a filename, so the actual letter can be loaded from within *Almanac*.

The second powerful feature is in the use of filters. *Almanac* allows you to create as many entries in the main screen as you like, so you can have any number of diaries (or address books, or whatever), all of which take their data from the same database, they just display it in a different way.

A filter is effectively a way of deciding which data entries should be shown in a section, so you can create your own tailored organiser. For example, you could create a section called *Acorn Letters* which would contain details of all your correspondence with Acorn.

The Sticky Pad displays the various links between data entries, and Sticky Pad entries can be set up to contain links to any part of the organiser, as well as any files or directories on disc. The Note Pad is exactly what is sounds like: it's for making notes.

Almanac is very easy to use, and is totally Risc OS compliant. It is exceptionally powerful, and I have the feeling that once you've bought it, you'll wonder how you ever managed without it.

Mark Moxon

KODAK CD

Kodak UK
£4.99 per disc
50p per image

Dig out those old negatives; photography has a new high-resolution role to play for Acorn computer users. In the not too distant future your favourite snapshots will become screenshots using the 'over the counter' service already established by Kodak.

In response to CD technology, Kodak has developed a process that will allow up to 130 photographic images to be transferred to one compact disc. All you have to do is provide the pictures and hey presto, one week later they are on a shiny CD disc.

There are approximately 20,000 outlets nationwide able to transfer your 35mm films to disc. You initially pay £4.99 for the disc with transferral costs of £12.99 for 24 or £16.99 for 36 prints, slides cost 60 pence per image.

Each time you take in the new images to put on to disc denotes a session and transferring all the images in one session has its advantages, as it allows the maximum 130 images to be stored. If you store images in multi-sessions you can only place up to 100 images on disc. The total outlay is around £70 for a full disc and you also receive a conventional set of 6x4 prints for your money. Duplicate Photo-CDs can be pressed for £24.99.



Photo-CD offers high-quality graphics at a low price

The Catch-22 factor used to be investing £300 in a Kodak player to see the results, but a solution is on the way. Acorn intends to embrace this technology in a similar way to the Macintosh and PC markets. The solution will be in the form of a low-cost application, that lets you to read Photo-CD images from an ordinary CD-Rom drive. The software will also feature over 40 image manipulation options.

Cumana's current 500 series will be able to use Kodak CD discs when used in conjunction with the Acorn application. However, they will only be able to read the images saved in the first session, thus ruling out multi-session Photo-CD discs, However, the new 600 series, at £524+VAT. will read full multi-session images. The 400 series machine is not compatible with Photo-CD.

This emergent technology is set to break new ground in allowing you to plan and develop the image libraries of the future.

Pete Worrall

SERIAL PORT

High Speed Dual Serial Port podule
The Serial Port
Tel: (0749) 670058
£69

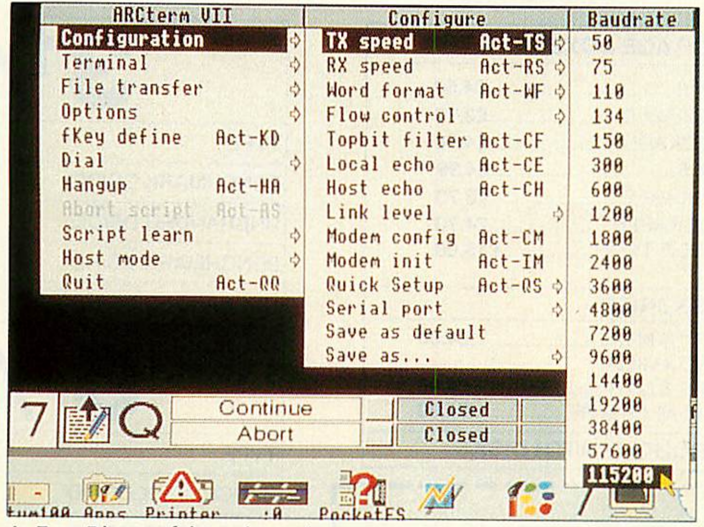
Archimedes users don't get the best of deals when it comes to interfacing their computers with the outside world. You only get the one port, it has a limited top speed and can be prone to errors at high speeds. On top of that, Arc serial cables require non-standard wiring connections.

The new High Speed Dual Serial Port (HSDSP) podule from, er, The Serial Port, promises to solve all the above problems. For £69 you get a card containing a pair of serial ports that can both operate at up to 115.2Kbps, six times faster than the fastest Risc OS supported speed (19.2K bps).

Although ordinary modems still operate at just 1,200 or 2,400bps, faster 9,600bps and 14.4Kbps modems are now more affordable. With online data compression systems like MNP5 or V42bis, these modems require faster serial rates than 19.2Kbps for optimum performance. 14.4K modems are much happier at 38.4K serial rates, and some higher performance modems advise a serial connection of 57.6Kbps.

Even at its comparatively modest top operating speeds of 9,600bps or 19.2Kbps, the Arc's standard serial port can be unreliable if Risc OS 3 is combined with processor-interrupt sapping loads like high-resolution screen modes and intensive disc operations. The HSDSP minimises these problems; the 16552 serial processor chip used has a small, but effective, buffer to avoid losing characters.

The specification sounds promising, but how well does it work? The early production review sample refused to work on my upgraded A420/1. The same card operated perfectly on an A5000. The Serial Port's Hugo Fiennes tests all cards before they are shipped, but it seems a minor hardware bug prevents the card from working with some machines. At the time of writing the bug was confidently expected to be squashed soon. The card was also too short to comfortably fit on the podule backplane and this will also be rectified.



ArcTerm 7 is one of the packages that can now take advantage of the HSDSP

The Serial Port's *ARCterm 7* comms application has been modified to support the extra speed and ports provided. Other comms applications like Beebug's *Hearsay 2* and the *Internet KA9Q* package have also been updated.

Atomwide is writing *RISCiX* and *RemoteFS* drivers too. Full technical documentation is available, and an optional driver enabling PC serial cables to be connected without Arc wiring modifications is also provided.

Assuming the early hardware teething problems are fixed, I congratulate The Serial Port for remedying one of the Arc's longstanding deficiencies. The HSDSP will be a boon to anyone who has more than one use for the serial port or who requires reliable high speed connectivity.

Ian Burley

SPRING SHOW BONANZA

There's nothing to lose and everything to win at the BBC Acorn User Spring show

Visit the BBC Acorn User Show in Harrogate this Spring, and you could win yourself a pirate's chest full of goodies. We have a prize to gladden the hearts of all including an Acorn Pocket Book computer. Every visitor to the show will have the chance to enter the Treasure Trail, sponsored by *Acorn User* magazine and TDK. The prizes will be sent to one lucky winner just after the show; over £1000 worth. So what's up for grabs?

First of all, the Acorn Pocket Book: a handy pocket-sized minimicro. And for your main computer, you can use Stallion's new *Almanac* software. This handy, desktop organiser could help you change your life.

If you are into music and sounds, Oak Solutions has provided the Oak Recorder, so you can sample sound direct on to your computer using a microphone which simply plugs into your Archimedes printer port. EMR's *Rhythmbox 2*, the drum roll editor, is sure to add to the impact.

Midnight Graphics Express is the easy to use, but powerful, graphic package for designers of all ages from Dabhand Computing. In the entertainment stakes, Krisalis has added *Sim City* and *Battle Chess* to the pack, and 4Mation has offered a copy of *Noot*, the animation package.

The printed word is well catered for in our Treasure Trove with *EasiWriter*, donated by Icon Technology, an very stylish word processor. Quill Marketing has offered a pack of refill ink for the winner's deskjet or bubblejet printer; whichever you've got. To help make your fingers fly over the keys even faster, Iota's *TouchType* programme (with wads of features) is included too. And Computer Concepts has included a copy of one of its most popular packages; *Junior Impression*. And to get the languages really rolling, Minerva are offering their new *Linkword* package, the language course for German, French and Italian.



Acorn's Pocket Book is just one of the valuable prizes in the treasure chest

To get you on the right tracks, Risc Developments is giving a copy of *Masterfile 3*, the multitasking database. Apricote's small business accounting application, *Prophet*, is also in the chest.

For younger users, Sherston Software has given us a set of their acclaimed *Naughty Stories*; these talking books use recorded human speech to help younger children to recognise and read words.

Infant Windows, from Porters Primary Software, introduces young children to word processing, drawing and painting and page composition.

The Spoken Word from Wyddfa Software, will delight children who are learning to read. And one that is sure to be a great success is a video of *Noddy and the Naughty Tail* to remind everyone that Jumping Bean's software package *Noddy's Playtime* will be available very, very soon.

HCCS will be giving one of its Ultimate Multipodules, to fit the winner's computer. This could be the start of your expansion system. And just in case you feel that the chest isn't full enough yet, DD International has donated a goodie pack which includes, a joystick, a Carousel Screen Sequencer, mini speakers, *Nosher* and much more. And last, but not of course least: you can have a year's free subscription to *BBC Acorn User*, your favourite magazine.

Quite a chestful, so a big thank you to all the exhibitors who have donated prizes. There will be a lot more in the chest by the time you get to the show, so come along to the *Acorn User* stand to check it out for yourselves.

THE RULES

The Treasure Trail Competition could not be more simple to enter. All you have to do is pick up your Treasure Trail map on your way into the show and look out for the letters shown on doubloons on some of the stands.

Note them down and at the end of the show try and compile an appropriate phrase made up of the letters. Hand in your entry to the *BBC Acorn User* stand and we will give you a free TDK disc just for taking part.

SHOW UPDATE

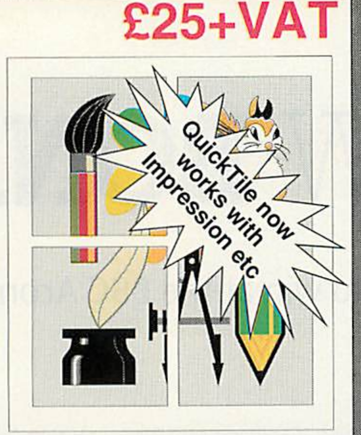
Several new companies have booked into the show since our special show guide last issue, so here is a more complete list of exhibitors:

Acorn Computers	35/37
BBC Acorn User	Centre
Ian Copestake	1
RISC Developments	3
Icon Technology	5
Iota Software	5
Minerva Software	7
Software 42	9
Acorn Computing	11
Wild Vision	12
Arm Club	19
Krisalis Software	23/25
Simtec Electronics	27
Vertical Twist/ Leading Edge	29
Archimedes World	31
Computer Concepts	33/39
HCCS Associates	41
SJ Research	43/99
Longman Logotron	45
Dabhand Computing	47
The Fourth Dimension	49
IFEL	51
Stallion Software	53
Digital Services	55
Colton Software	57
Cambridge International Software	59
Irlam Instruments	61
Uniqueway	61
DD International	63
Lindis International	65
Jumping Bean	67
Apricote Studios	69
Porters Primary Software	70
Oregan Software Developments	71/73
Sherston Software	75
Morley Electronics	77
PRES	78
Intregrex Systems	79/81
Oak Solutions	83
Avatar/Silicon Village	89
Norwich Computer Services	91
Electromusic Research	92
Quill Marketing	93
TBA Software	95
ArVis Multimedia	97
Micro-Aid	105
Wyddfa Software	107

Your RISCOS Compliant Acorn Dealer!

QuickTile £25+VAT

Up until now it has only been possible to print posters from Draw and Sprite files. Now with QuickTile you can create posters from ANY RISCOS application. The user simply enters the size of the source document, select the required poster size and then PRINT directly from the application! QuickTile does the rest, printing each tile with crop marks and tile references.



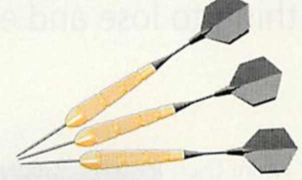
TopicArt

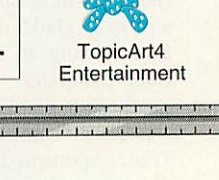
A new form of clip art comprising of single discs containing approximately 50 hand drawn high quality draw format clip art images, each on a single subject. Site and area licences are available, please ring for details.


TopicArt9 - Dinosaurs

Subjects available
1 - General
2 - Transport
3 - Costumes
4 - Entertainment
5 - Bugs 2 Slugs
6 - Road Signs
7 - Sports Equip
8 - Sports Figures
9 - Dinosaurs
10 - Symbols
11 - Tools

£8 + VAT per disc


TopicArt7 - Sports Equipment


TopicArt4 Entertainment

11 TopicArt subjects are available now. Please specify when ordering.

TopicArt8 Sports Figures

Buy 4 TopicArt discs get one free

TopicArt11 - Tools

Finance 14.7% APR

Product	Deposit	24 mths @	Total
A3010LC System	79.00	34.50	907.00
A4000HO Standard	117.83	50.60	1332.23
A4000HO MultiScan	123.58	53.14	1398.94
A5000LC System	169.00	73.31	1928.44
A4HD60	199.23	86.11	2265.97

The above finance is available to anybody over the age of 18, subject to status. Payment Protection is available on application. Special offers do not apply to purchases on finance.

Acorn Ext Warranty

1 Year On-Site Service

A3010, A3020 or A4000	£25
A5000	£34

3 Year Warranty & On-Site Service

A3010, A3020FD	£42
A3020HD, A4000	£51
A5000	£68

The above must be purchased at the same time as the computer system. Call for further details.

Ink Jet Refills

Why throw away empty inkjet cartridges... ...when you can refill them at a fraction of the cost

Colours available include
Cyan, Magenta, Yellow, Black, Red, Green, Blue, Brown

Single Refills (req an orig cartr.)	£6
Twin Refills (req an orig cartr.)	£11
Please specify colour(s) required	
125ml Cleaning Kit	£4
400ml Cleaning Kit	£9
ColourSep software	£15

Can be used with DeskJets, BJ's, JP's + others. Ring for further details.

Hardware & Books (All prices exclude VAT)

Pocket Bk/Psion

Acorn Pocket Book	£212
Psion 3 256k	£185
A-Link for either of the above	£51

Call for other peripherals

A3010 Series

Family Solution £424
With 2 Free Joysticks
Connects to std TV. 1Mb RAM, Floppy drive, 2 joystick ports.

Learning Curve Sys £680
With Free JoyMaster Software & Joystick
As above with 2Mb RAM, Standard Monitor & Learning Curve software.

A3020 Series

With Free PenDown Plus

Floppy Disc System £749
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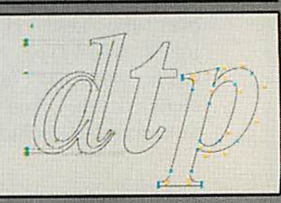
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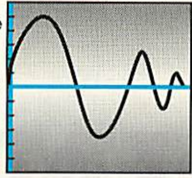
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MAY 93



THE EXTERMINATOR

They're back! BBC TV's Peter Clements uses his A5000 to recreate that lovable race of supreme beings, the Daleks

The Dalek is a uniquely threatening image, well known to *Doctor Who* fans throughout the world, who will usually remember hiding themselves behind the sofa as children. As such it presents a great demonstration of the design prowess of an Acorn machine.

I have always been fascinated by model making. Whether for a visual TV effect or a model railway, the art of miniaturising or enlarging an object, precisely to scale, is one that demands a skilled eye and a good deal of patience. Armed with a number of Clares' packages, I undertook to create a complete moving, speaking Dalek, based on the original design. Subscribers can see the final version of the Dalek on their monthly disc, and this is how it was done . .

DALEK DESIGN

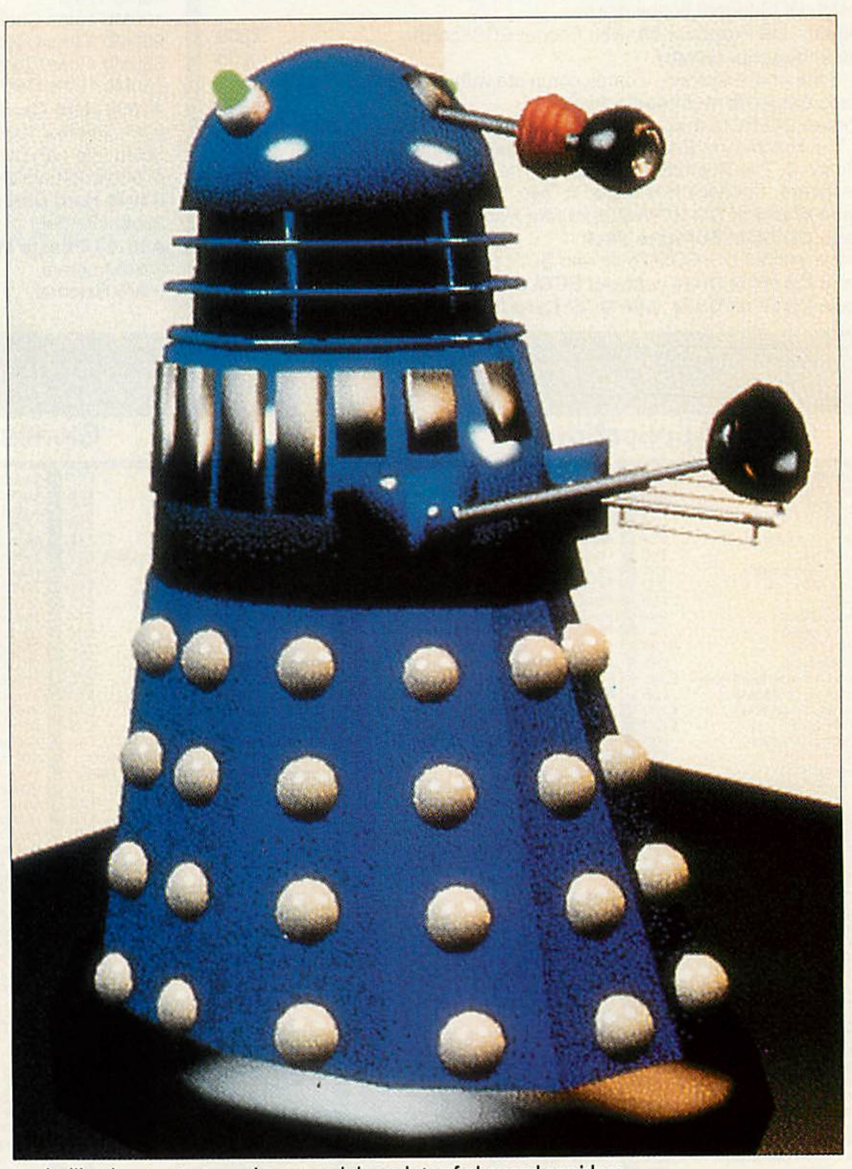
Several versions of the Dalek have appeared, but for this walk-through I chose the MkI version. This had a rounder, flatter head, with smaller lights than its big-screen successors and used the famous sink plunger arm. And yes – it really *was* a sink plunger, although it was later replaced with a gripping hand at the end of the prod rod.

My reference source for the Dalek design was a *Radio Times* feature 15 years ago. As part of a *Doctor Who* special, it pictured a set of plans to build a full-size version, including the internal construction. However, for your own designs, any detailed reference photo will do.

I cannot over-emphasise the importance of scale. My computer model is comprised of lots of different geometric shapes which, at the end of the design period, should add up to one recognisable object . . . the Dalek.

How you perceive that end view is entirely up to you. If it doesn't look quite right, then some detail is obviously wrong. Maybe the lights on the head are too small, maybe the eye is too large or maybe the lower body isn't the correct shape. What I am trying to stress here, is that the whole designing process of any scene is the most important and time-consuming part.

The Dalek was very hard and at times awkward to visualise and it was certainly something that I would not embark upon unless I was completely *au fait* with the software. When I was first started to use *Illusionist*, the scenes I created were very simple, with few objects. As I progressed, I added more and more objects and arrived at some very complex scenes. When these were rendered, they looked so impressive that even my lips were left in the shape of a 'wow'.



Looks like time to start running up and down lots of plywood corridors . . .

THE TOOLS

The Dalek was created using a variety of software packages from Clares Micro Supplies: *Illusionist*, *Pro-Artisan*, *Armadeus* with a sampler board, *Animator* from *Render Bender* and the *Sequencer* from *Titler*.

Illusionist is a 3D design program that lets the

user create objects from geometric shapes, assign textures or maps such as wood or marble to these objects and apply surface colours and finishes such as gloss, metal or plastic.

Single objects or room scenes can be created and the user can even have control over lighting conditions. You can go on to specify such things as the type of light, its colour, or the spread of the beam.

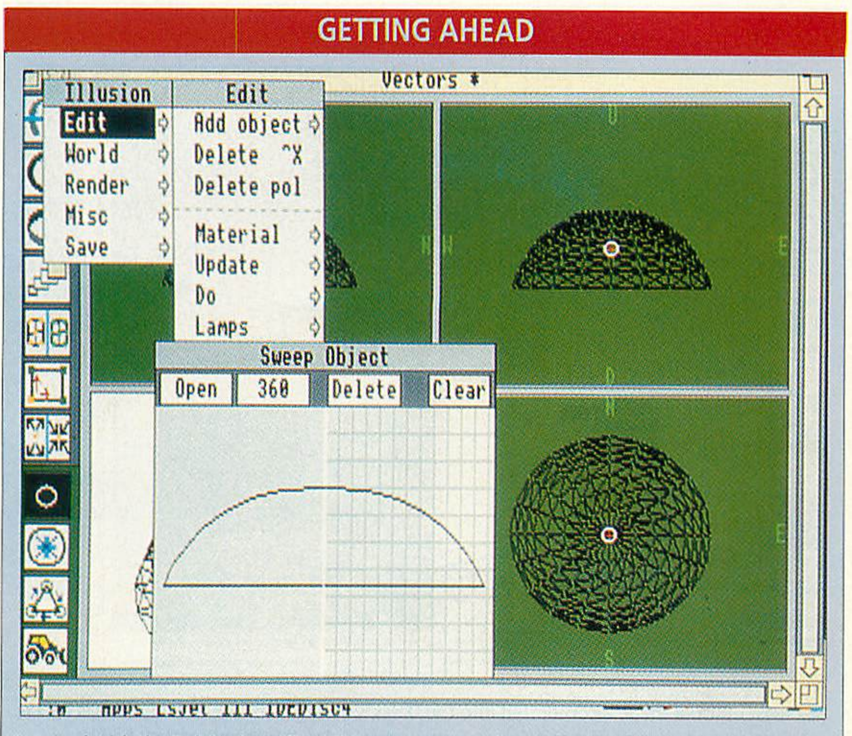
THE FINAL CUT

The complete design process is explained in the boxes and I found the software extremely easy to use. When it came to putting all the images together, I used *Pro-Artisan* to cut frames two to ten as sprites and pasted these smaller pictures back on to the first one, saving each in turn as a full screen picture. These were then loaded into *Animator* and compiled into a stand-alone application. When the head reaches its greatest degree of movement it loops back and follows its original path back to frame one. When set running the head repeats this action and can be either run normally, speeded up or slowed down until it stops.

Sound was added at the end. I wanted my Dalek to say something a little bit different from the usual 'Exterminate, Exterminate!' For this reason I wanted a piece of speech that would make the Dalek sound as though they meant business. I bought a *Doctor Who* video and went through it until I found the passage I was after. This was transferred on to cassette tape and then into the line-in socket on the back of the *Armadeus* sound sampler board. I had captured about 20 seconds of sound and only needed to clean up and edit the sample at either end of the chosen section.

The result is about 14 seconds of speech. As with the animation, this was set to loop repeatedly. There was nothing further to do by way of enhancement of the speech, as the software had accomplished that for me. I was then ready to combine the two component parts, animation and sound, into one stand-alone application.

GETTING AHEAD



I started with the Dalek's head first. This was made up from a Sweep object, as indeed were a lot of the parts. A Sweep object can be designed by the user simply by drawing the right half of a slice of the shape in an editing window, and the computer mirrors the left half as you draw.

If you understand how this process works, then you can create circular shapes that are quite complex in their construction and offer more scope than the other standard geometric shapes that *Illusionist* provides.

An object can be assigned a number of sides, which, in effect, controls the degree of smoothness a circular shape has. The number of sides is normally set to ten, as can be seen on the sink plunger arm, but was changed to 20 for the head, the lights and the hemispheres on the body.

Doubling the number of sides also has the effect of doubling the information for that object when saved to disc, so use this function with caution, as it is all too easy to run up very large files. Although these might just squeeze on to a disc, they might not be rendered at all if there is not enough memory in the computer.

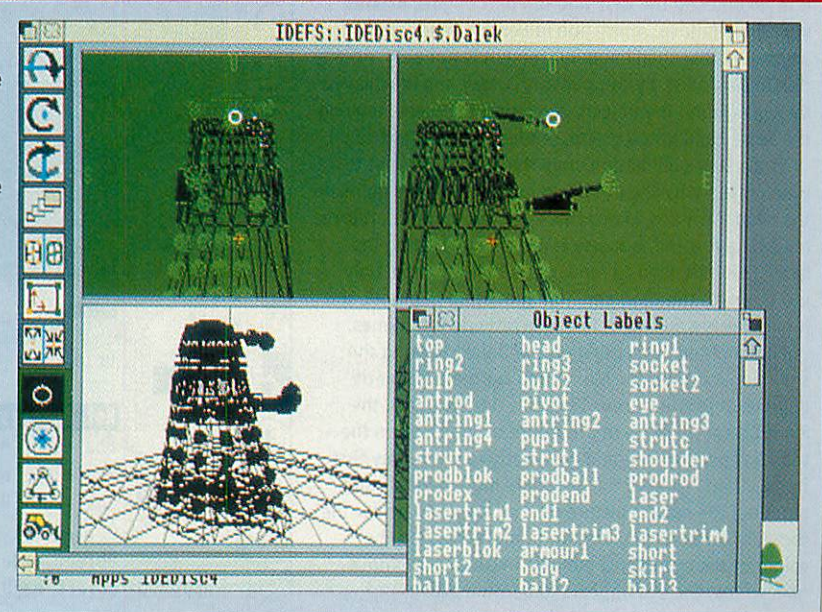
At least the Dalek's head showed a lot of regularity. I was later to face the construction of the lower body, a bizarre 11-sided polyhedron (see next page).

THE JOINING OF PARTS

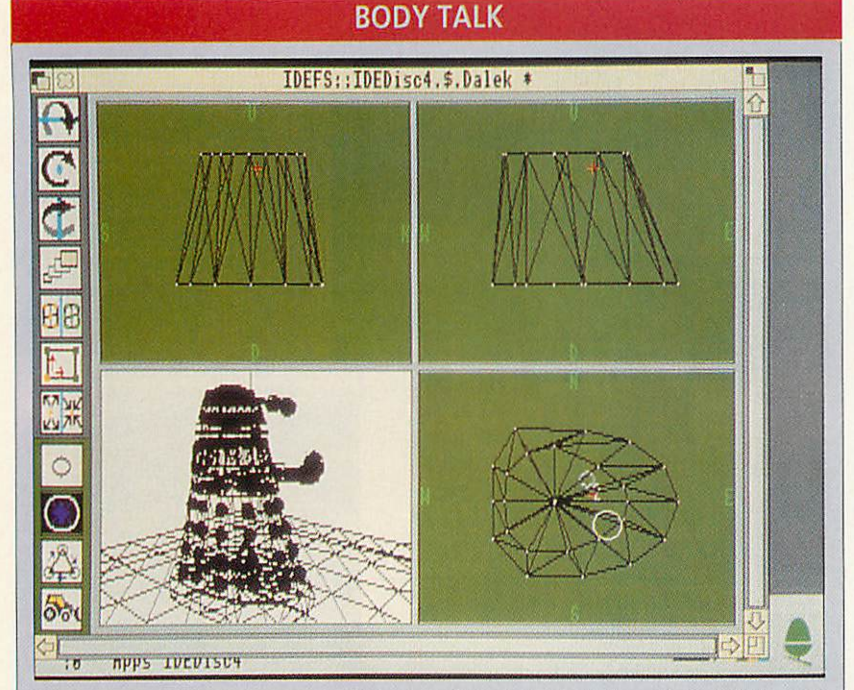
The method I used was quite simple: each component part was designed in turn and placed in the editing window. There are three of these showing the front, side and top view.

Objects can be scaled and rotated in each of the elevations or profile panes and the observer and target positions set. Clicking on the white window draws a wire frame image as seen from the observer position. This is what your finished view will look like. When moving an object or group of objects to a new position, clicking with Select in the label window will cause the intersecting points of each object to be highlighted in white, making it easy to see which objects are active. It is very important to be sure that you only move the parts you intend to, as it can sometimes be very time-consuming to put back something that has been dragged by mistake into its original position.

When creating an object in *Illusionist*, always give each object a name. Each component part that makes up the object then becomes a lot easier to access. Simply click Select on the object name to change the colour of the object or to move it to a different location.



BODY TALK



The most unusual shape incorporated into the Dalek's design is the lower body. This is an 11-sided object and I designed it as a Sweep with vertical sides. It was only after it had been placed in the scene that I was able to select single points from the base of the body and drag them one at a time to create the more familiar shape of the lower section. I used the technique of placing four spheres were in a line, then grouping and copying them so that each line of four became a new object.

By careful adjustment in each of the profile panes I was able to angle each group of spheres more or less precisely. At this point, I had to cheat; my particular disc file was at this time becoming quite large so, to cut back on memory, I only placed the spheres that would be visible from the observer's position into the scene. What you have is a sort of film-set Dalek; but it doesn't show.

It is very much up to the individual as to the colour of their Dalek. I have opted for blue, but a gloss black with metallic gold trim is particularly attractive, and also implies an individual higher in the Dalek hierarchy. If you're not sure, here's a tip. First render the scene in mode 13 without using anti-aliasing. This gives a very coarse picture in only a short time, but you can at least tell if the colour of your model is to your liking before deciding which parts of the picture you are going to animate.

Combining sound and vision is probably the easiest task of the entire project. This was done in the *Sequencer* section of the *Titler* package and in fact most of Clares' demos use the same approach.

When *Sequencer* has loaded and shows on the icon bar at the bottom of the desktop, clicking upon it will cause a window to open. All that needs to be done is to firstly drag your saved sample to the window and then your animation and the software does the rest. You can adjust parameters to control how fast or slowly the animation runs. The combined sound and animation can then be saved back to disc as a single application.

The finished Dalek animation with its sampled sound is rather large and requires a two megabytes in order to run. Of course, most people do not have access to this many products but the animation (without the sound) can be created using just the central design package, *Illusionist*, and *Animator* on its own to animate the creation.

The final Dalek can be seen on the monthly disc but I wonder what Terry Nation, the original creator of the Daleks, would have done if he had had access to a modern Acorn machine and a good selection of graphics software.

Peter Clements is a senior photographics technician for BBC Television, and has designed imagery for programmes including The Software Show *and* Science Challenge

PRODUCT DETAILS

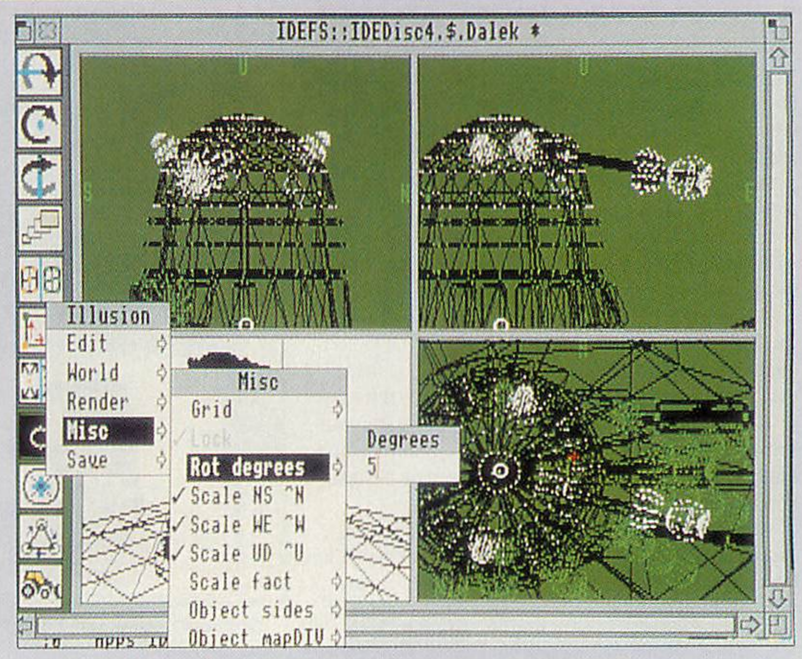
Illusionist: £85.06
Pro-Artisan: £89.36 plus VAT
Armadeus sequencer : £174.47
Titler: £127.62
Render Bender (including Animator): £85.06
Animator: £21.23
Available from Clares on (0606) 48511

MOVING PARTS

This is where the hard part, designing and construction, is at an end and the easy and fun part begins; making your model move. Animation in *Render Bender* using anything other than linear movement is not easy. Animation in *Illusionist*, by comparison, is easy and is achieved by highlighting the objects, rendering the scene, moving the same highlighted group, rendering again and so on.

In the Dalek animation, only the head turns, but there is no reason why the eye could not move or the lights on the head flash and so on. There are ten frames in total in my animation and, because I was only animating the head, I did not need to render a complete frame, only just down to the shoulder. This speeds up the work and it only takes a couple of hours to provide ten frames.

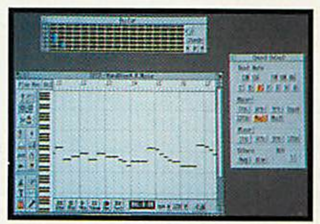
I highlighted everything on the Dalek down to the shoulder and from the Misc menu set the number of degrees of rotation from 15 to five. I then placed the Plant Cursor precisely in the centre of the head on the top view profile pane and was ready to render my first frame. Then I rotated the head five more degrees and rendered the second picture but just down to below the shoulder level. At the seventh frame, I changed the colour of the eye from a metallic finish to a luminous one, so that the eye appears to become active.





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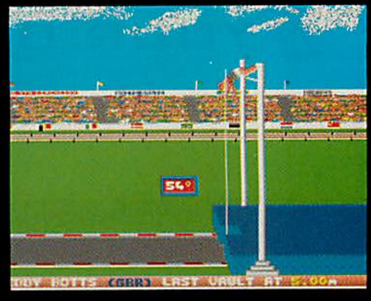
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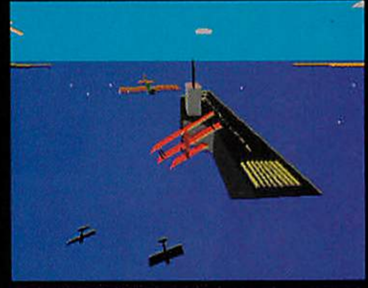
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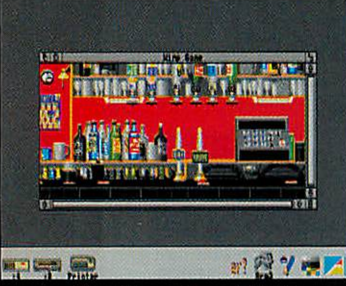


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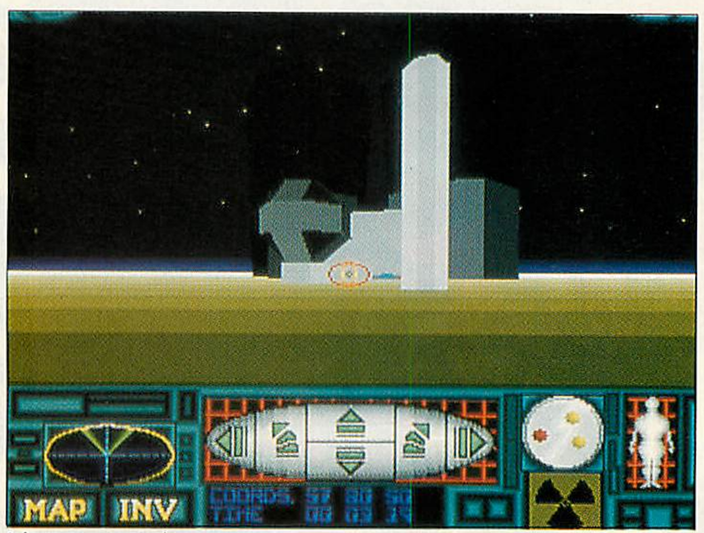
GAME SHOW

It may seem an unusual time of the year to have an *Acorn User* show (Spring) and an unusual place to hold it (Harrogate); but, as long as the latest games are there, this columnist is happy.

Krisalis Software is on stand 23/25 with its full range of products, including the eagerly awaited *Sim City*, reviewed this month. Although *Sim City* has been available on the BBC Micro for two and a half years, it is only now we see it migrating to the 32-bit world.

Also on the stand will be Krisalis' conversion of *Battle Chess*, the hugely popular 'violent' chess game where instead of just *taking* the pieces from your opponent, you positively pulverise them. Turn to this month's Game Show competition to win yourself a copy.

On Stand 49 The Fourth Dimension will be releasing its latest game, *Dungeon*, a 3D *Gauntlet*-style arcade adventure. *Dungeon* can be played by up to four players who each have their own energy level and different battle strategies. Armed with medieval-style weapons and the odd magic potion you move through the dungeon fighting huge green spiders and skeletons.



Ixion pops up again

CIS, on stand 59, will be showing the latest stream of games like *Killer Bugs*, *Serpents*, *Humanoids*, *Robotix* and no doubt several others.

It's good to see new games houses booked up for the event, especially promising ones like Software 42, which last year released one of the best games in the 32-bit world, *Ixion*. The company will be releasing three new games at the show. *Cycloids* and *Fred* have been mentioned before as, respectively, a whacky, red-nose, unicycle platform game and a tricky puzzle game with lasers and mirrors. The company is offering a special reduction to people who buy both at the same time. The third game is *Raw Power*, a beat-em-up martial arts game.

Last but not least, TBA Software is the latest addition to the Acorn games world, and it brought with it the mildly disappointing debut release, *Dragonball* (reviewed last month). At the show, on stand 95, TBA will be launching a horizontal shoot-em-up called *Axis* and a zany yoyo game called *Psychic Yoyo*.

All this and more will be available for you to try out at the show next week.

Sam Greenhill

CONSOLE FEVER

In a high-class Las Vegas hotel recently, a new machine was unveiled to the US market that promises to knock the socks off any games computer currently in existence. It was billed as the dawning of a new games era and the 1,000 or so journalists gathered at the launch didn't beg to differ.

The machine is called 3DO and, although it won't be available in Europe for a few months, it is based on 32-bit Risc technology.

The 3DO Interactive Multiplayer can animate 64 million pixels on the screen every second and has a palette of literally millions of colours. The Risc processor at the centre of the machine is complemented by a custom graphics and sound chip, making it the fastest consumer games computer in the world. With power like that, we're talking about games whose appearance will be 'near-television quality'.

The Risc technology leaves existing CD-based machines on the starting blocks. CD-i, CDTV, Mega CD; these will all mean nothing because it will all be in the 3DO machine. The new console, which will sell for about £300, can already play music CDs and, as soon as the movie industry settles on a few standards, there will be CD movies available too.

There are two particularly interesting things about 3DO. Firstly, the console has attracted a lot of attention from Hollywood. Companies such as Warner Brothers, Universal and Paramount have suddenly twigged that they can use the sophisticated techniques of the movie business to produce top quality games based on films.



The 3DO console promises to revolutionise computer entertainment

Better still, if games are becoming more and more like films, why not produce films that become more and more like games? In other words, interactive cinema. The next Steven Spielberg film, *Jurassic Park*, will be launched in the summer and followed soon after by an interactive movie version with live actors and clips from the film.

Perhaps the most significant thing for Acorn users is that many of the world's finest games programmers will want to start learning how to program for this blockbuster, mass-market console.

They'll be doing this by using Acorn machines, very probably, and are bound to produce some top notch entertainment software for the Acorn market.

Maurice Truman

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The most challenging game on earth comes to life in Battle Chess. An entire medieval world at war is reflected on the checkered field.

Everyone who's ever had a knight take a pawn has seen that capture as more than one piece replacing another on the board. In players' minds, the bold knight, resplendent in his armour of silver or ebon, sallies forth and slays the foul footsoldier. Combat, mortal combat, is the heart and soul of chess, but this aspect of it can only live in the mind's eye... until now!

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SIM CITY

Krisalis Software
Tel: (0709) 372290.
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£34.99

It is a well known fact that politicians are conniving, callous schemers who are only ever nice to registered voters and their gruesome babies. But this portrayal is less than fair when that politician turns out to be none other than the mayor of Samville.

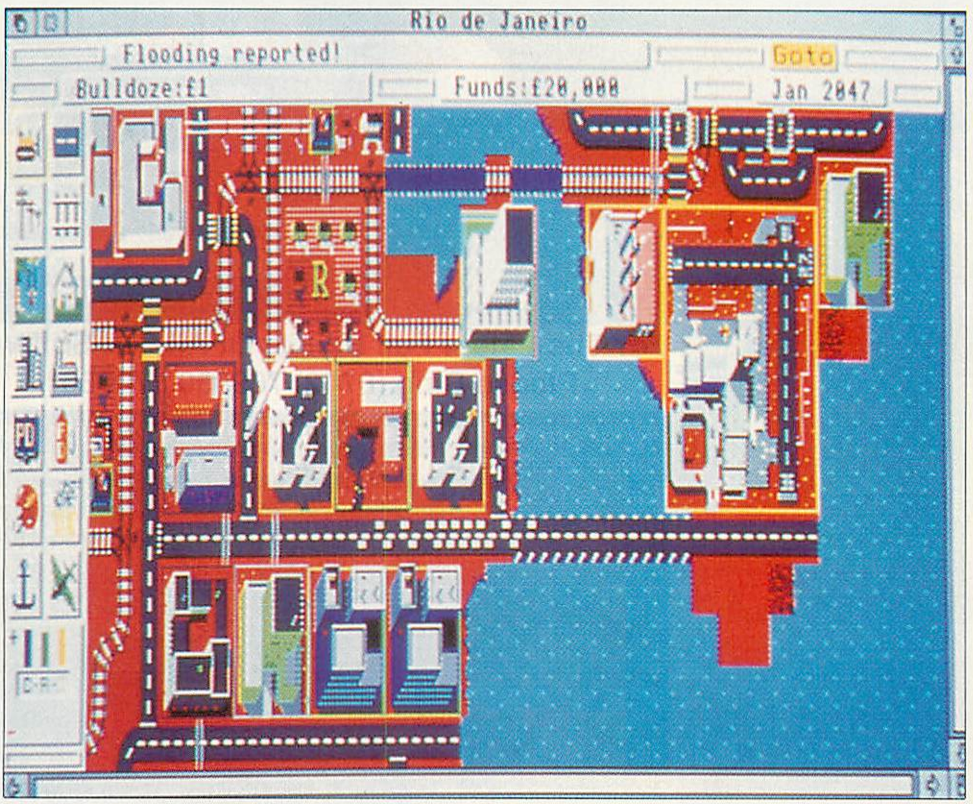
This phenomenally patient mayor has to put up with obnoxious and unreasonable voters on a daily basis who clearly have no capacity for logical thought and apparently don't appreciate his great skill at running a city. But running it into what?

That's the situation you find yourself in when you play *Sim City*, the latest blockbuster game from Krisalis. You have the power to design a city using roads, railways, factories, offices, houses, police stations, power plants, power cables, airports, sea ports; you name it. The city is continually judged for 'success' by a set of complex formulae that were devised for the game by the careful study of real cities and the behaviour of the citizens.

Being the mayor of Samville is a slimy job, but somebody's got to do it. Despite a population of over 70,000, Samville is a friendly place with an enviously low crime rate.

As he watched Samville grow, the mayor was proud to open many new facilities. A sea port sprang up, doing wonders for the export potential of Samville's industrial sectors, and the city was so overwhelmed with joy when the Samville International airport was first opened that it managed to overlook the aircrash that took the lives of several hundred registered voters. This, of course, was quickly forgotten once the flooding began and even that was regarded as trivial compared with the earthquake the following week.

Samville's citizens mourned at their losses but were soon welcoming the arrival of a nice big nuclear power station which the mayor – from his bunker – gave his fullest assurances was perfectly safe.



Sim City: you can fool some of the voters some of the time, but . . .

The residents of Samville love their mayor and he loves them. Without his astute qualities of management the city would be in turmoil, plagued by crime and fire, depressed by unemployment and soaring house prices, clogged with traffic congestion and disease spread by slum housing conditions.

So why, in this eventually sad story, did the residents all pack up and leave? Because absolute power corrupts absolutely and the mayor became too greedy with his taxes. Samville was soon a ghost town.

To avoid this happening to you one day, follow this simple rule: buy *Sim City* and get some practice – and a great deal of fun – first.

Sim City works in the Risc OS desktop, which means it is running while this review is being written, although it slows the Desktop down so it feels like I'm typing at five words per minute. The map of the whole city occupies one window and a close-up of that map takes another.

Other windows around the Desktop have information for the mayor on his popularity and his citizens' problems, another asks for the tax rate every year, and others show graphs on populations density, pollution density and crime rates along with umpteen other handy graphically presented statistics. All in all, it can get a little crowded.

The object of *Sim City* is to build and manage a city, year by year, collecting taxes and expending the revenue on things like roads, railways, power stations and electricity grids. These must be placed in positions that best serve the people's interests.

As chief planner, a critical task is the designation of residential, industrial or commercial zones. Like everything in *Sim City*, the mayor merely establishes 'the right conditions' for growth and the computer simulates the rest. Provided the residential zones are well connected – but not too close – to the industrial parks and they have power and police protection, before long they will develop into high-rise accommodation where thousands of people will flock to live.

Sim City comes with a short list of existing scenarios – including overpopulated Rio de Janeiro and earthquake-shocked San Francisco in 1906 – but it is more fun to start from scratch and build your own city from the ground up. A random landscape is generated to include rough terrain and wide rivers.

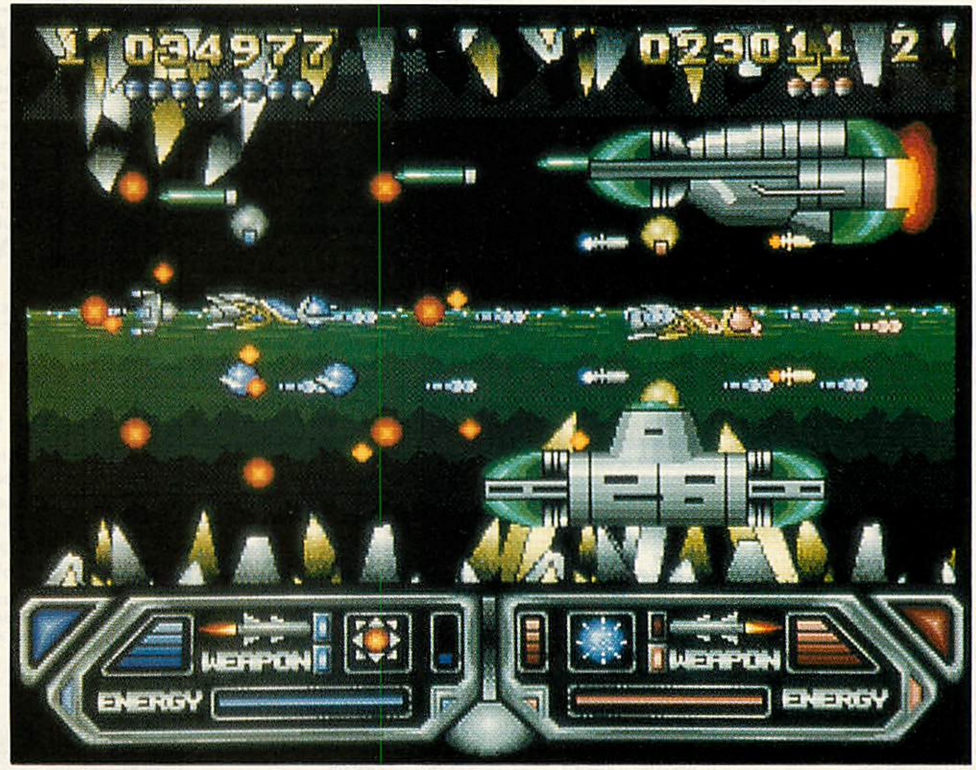
The fact that *Sim City* is multitasking is perfect for a game that should largely be left to its own devices anyway, but unbearable slowness is the unfortunate trade-off here. It is possible to die of boredom before mouse operations like building a road have been completed. Another problem is that the Desktop palette also needs to be adjusted every time you play to avoid ordinary soil looking distinctly tomato-coloured.

In spite of this, *Sim City* is definitely a winner, a fantastically addictive game and worth every penny of the higher than usual prize tag. Go on, you know politics is for you. Everybody will hate you but you'll have exceptional fun making enemies.

Sam Greenhill

TECHNODREAM

Superior Software
Tel: (0652) 658585
Risc OS machines
£24.95



Technodream's action gets so fast and furious the screen looks like an abstract painting

This is billed as the big one, the sequel to *Nevryon*, that fiendishly tricky shoot-em-up of a couple of years ago. *Technodream* is the long awaited sequel but is it really bigger, better, faster and more furious?

There was only one way to find out: buckle up and start zapping. The game begins with the small blue spacecraft launching from a space-age hanger and sliding up into the sky to meet the baddies.

The first generation of alien ships are relatively harmless; they just pass on by, getting shot if they're dumb enough. But soon after that, without much warning at all, it suddenly becomes quite challenging and you can hardly see for firebombs.

One of the main improvements made in *Technodream* is the introduction of a two-player mode, a feature sadly lacking in the original, *Nevryon*. With your best friend by your side you feel as though you can't lose. It brings a whole exciting new aspect to the game; you have somebody else to blame when it all goes wrong.

In *Technodream* the object is perfectly simple: shoot it if it moves, shoot it if it doesn't move and if you're still not sure, shoot it anyway. And there's plenty to shoot, the further you get, the weirder the aliens become.

Of course, with all games of this type, there are loads of power-ups to be collected. The first power up installs a couple of rocket launchers that fire automatically every few seconds. The most useful power-up is the shield, which can either be left positioned at the front of your ship or can be fired ahead of you where it wreaks havoc with anything that falls in its path.

The power up system in *Technodream* is actually quite amusing. It's all a bit like a petty school playground argument that gets completely out of hand: whatever power-up you get, the baddies get an even bigger one. So you get a bigger one still. And so on. Before you know what on earth is going on you're both pumping so much lethal fire, rockets and molten metal at one another that the screen looks like something even the director of *Die Hard* would be bewildered at.



Weep as your good buddy buys the farm

And that's where the second main improvement that *Technodream* boasts comes in. There's more space for all the extra explosions. Now you can scroll up and down the screen a short way too and this has both advantages and disadvantages. It may give you more space to get out of the way but, hey, we're all fearless here, right? We don't want to get out of the way so much as blast the pants off the aliens and now they've got a cunning escape, just off the edge of the screen.

The vertical scrolling can also cause some frustrating moments in two player mode when you both suddenly need to get the hell out of the way of some particularly nasty alien and while one leaps up to the top, the other one dives for the deck . . . The screen can't scroll both ways and you both end up in the middle facing the marauding beast.

The graphics in *Technodream* are extremely detailed and very colourful. The music plays during the actual game itself, which adds to the good atmosphere, but the sound effects themselves are a bit quiet and forlorn, I think.

The options screen gives you the opportunity to redefine the keys but, for some reason, you can't use the numeric keypad so fingers tend to be a bit cramped with two players on the main keyboard, each with seven keys to contend with.

Technodream comes on two discs and, after the huge wave of criticism levelled at its predecessor for taking so long to load between games, it is pleasing to find the authors have evidently made an effort to reduce the overall time between the 'game over' message and the start of the next game. However, this can still take nearly a minute.

On the whole, *Technodream* is a highly polished product and well worth the asking price of £25; now the standard for 32-bit games.

Sam Greenhill

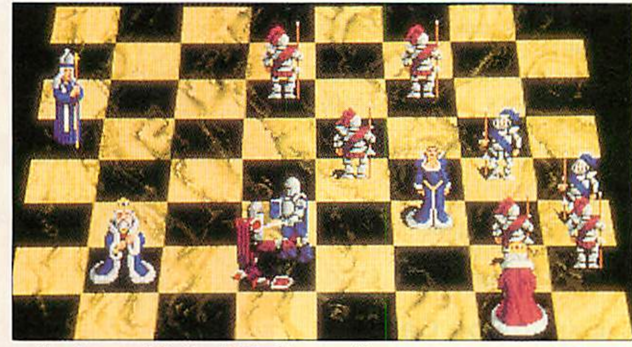
BATTLE CHESS COMPETITION

Never mind the championships, *Battle Chess* from Krisalis Software (reviewed last month) is the most exciting chess game you'll ever see. Where else have you ever seen the pieces barge their way across the board, or bash the living daylights out of each other? Where else is there a queen so full of grace that her 'eliminations' are carried out with lethal elegance? And where else are the foot soldiers so stupid as to get into a fight with a ten-foot ogre made from bricks?

Excitement, action, violence, and it could all be yours; free! *Acorn User* has five copies of the only chess game to give you gore, to award to the winners of the *Battle Chess* competition.

To win a copy, simply answer the three questions below and then complete the tie-breaker. Then send your answers on a postcard or the back of an envelope to:

Battle Chess Competition, Acorn User, 101 Bayham Street, London NW1 0AG. The closing date for entries is 1 June 1993 and the editor's decision is final.


You too can join the Battle Chess melée

1 Name the British chess player who will be battling it out on a real chess set with Russian chess supremo Gary Kasporov at the World Chess Championship later this year.

2 One of the funniest conflicts in *Battle Chess* is when two knights clash. The duel is based on a scene in the *Monty Python and The Holy Grail*. What is the name of the actor who played the dismembered loser in the film?

3 Which square does the black king always start on? Black or white?

PARADROID

Coin-Age
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Déjà vu or what? *Paradroid 2000* takes me back to the ancient Spectrum game *Quazatron* in which you are a lone robot who has to save an entire colony, not from a small bunch of the normal run of the mill bad guys, but from the Trimorg Empire (where do they get these names?)

Some freighters, sent to save the earth's colonies, are tampered with. The battle droids are activated and the crew robots go haywire as well, just to make matters more confusing.

Due to government cutbacks the freighters cannot be destroyed, and sending troops would be as about as popular as sending them to Bosnia. So it's once more down to yours truly to save the day. You are a Mark 2 Influence Device who has to clear all five of the freighters of rogue robots.

This is generally done by manoeuvring your ball bearing look-a-like around the decks of the freighters, which are viewed from above, zapping the rogues and attempting to 'transfer' with them. This allows you to engage in a sort of duel of electronic circuitry with the robot so that you may steal its body, vital for improving your firepower and armour.


Paradroid: an unearthly world full of killer robots

The graphics are not stunning but there is commendable attention to detail, like the computer screens lighting up the desk when you use them. It is the detail that makes the game curiously addictive after initially being frustrating. After a while I really got into being a sentinel – one of the more powerful robots – going around and destroying all and sundry. Far more interesting than being a boring cleaner robot.

There are several levels to clear on each of the five freighters. This would keep you occupied for quite some time but I'm not sure the game is varied enough to hold my interest for that long.

Overall the game is a dream for the inquisitive-minded, especially because the instructions are very minimal and there is much left to discover for yourself. It *is* fun, it's just that level after similar level does tend to get a bit of a drag. *Paradroid* is a game that grows on you, but I think it is only for the dedicated fans of this genre.

Josef Koestler

CHEAT'S CORNER

POPULOUS
In all, there are 500 worlds in *Populous*, so we're spoiling none of the fun by giving a little help to those stuck near the beginning:
1.Genesis
2.Swaver
3.Mornigill
4.Weavhipham
5.Bugqueend
6.Verymeend
7.Shidiehole
8.Calozboy
9.Swaingpal
10.Morhippil
11.Bilador
12.Ringgbpal
13.Hobozjob
14.Sadmpt
15.Futloplug
16.Timomar
Passwords supplied by The Bear, St. Albans

AIR SUPREMACY
In *Air Supremacy* from Superior Software, you can swap between air and ground/sea forces as the battle develops.

But, if you've got your biplane in a rut or your WW1 tank stuck in the mud, try these passwords, from Tim Williams in Brendon, North Devon:
Level 2:Scramble
Level 3:Staccato
Level 4:Equanimity

SWIV
This the ultimate shoot-it-whether-it-moves-or-not game from Krisalis Software To cheat at *Swiv* press F1 to pause the game, then type NIGEL. Now press RETURN for infinite lives and, back in the game, shoot one of the token credits repeatedly, until it turns into a star, to get eight-way rapid fire.

Fiery thanks to The Bear of St. Albans for this.

BLITZ
Here's a cheat for the most popular *Pang* conversion in the Acorn games world.
The passwords for this come from Tim Williams in Brendon, North Devon.
Level 2:Seirra
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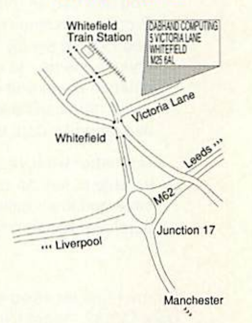
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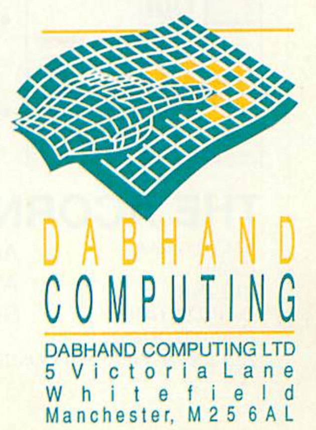


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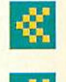
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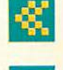


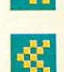
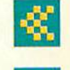






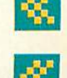
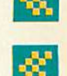











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Prophet is completely RiscOS compliant and will run on any of the Acorn 32 bit range of computers although a minimum of 2mb Ram is required.

Prophet costs £199.75 inclusive of postage and VAT and is available from all good software suppliers or directly from us in the UK (tel: 035 478 432) or Winsley & Hall in New Zealand (tel:09 630 9691). Other overseas versions are available.

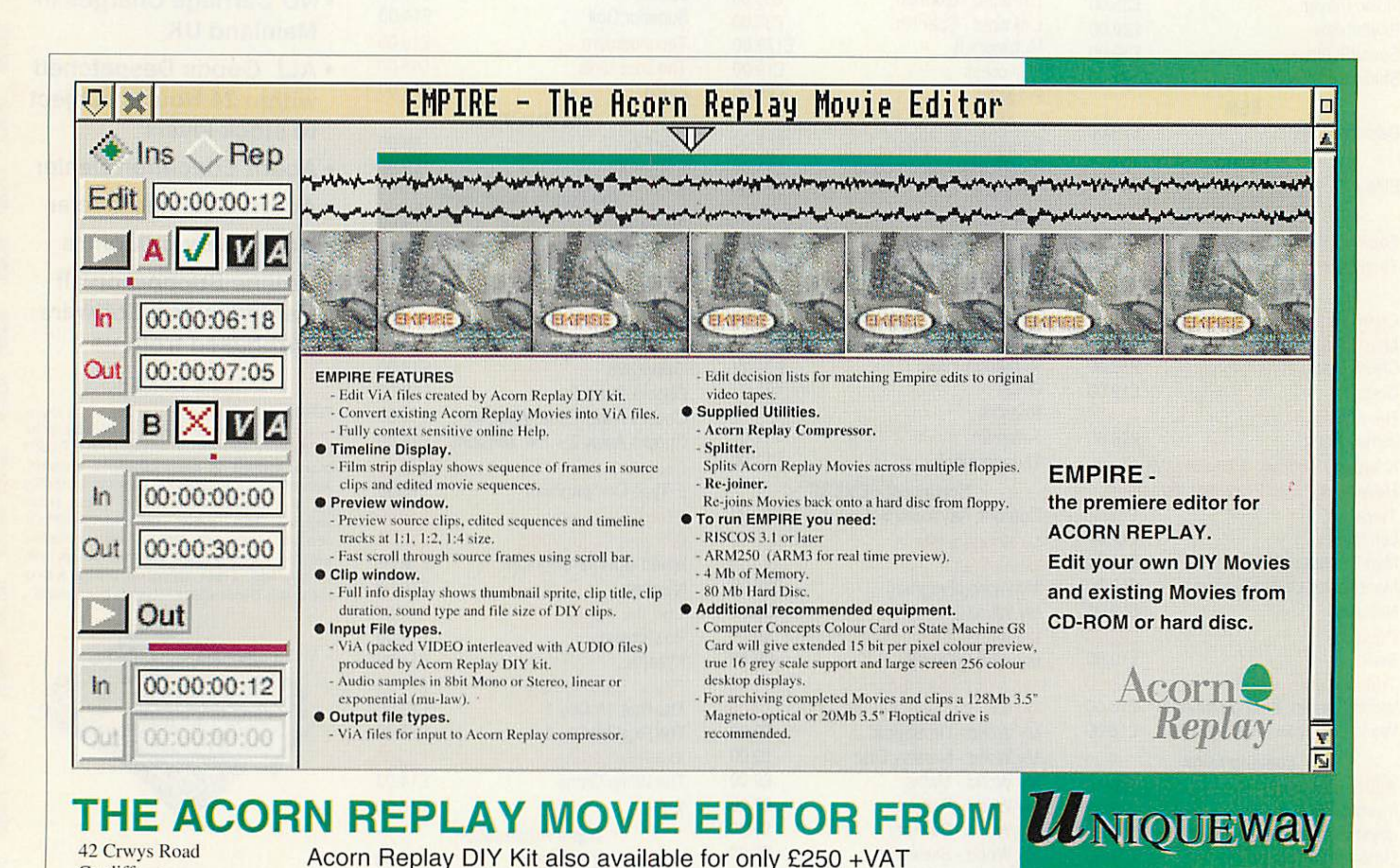
Please ask for our free brochure. A demo disk is also available for £10 including post & VAT. This **includes the save option** so you can really give Prophet a test drive. (the cost is refundable on full purchase).

Prophet has received extremely favourable reviews in all the Acorn Magazines - (Archive May 92, Risc User July 92, Archimedes World Sep 92, Acorn User Oct 92, Acorn Computing Oct 92). The current version of Prophet has a myriad of extra features based on user feedback and this combined with our policy of **free upgrades** ensure that Prophet will always remain the first choice for accounts software on the Archimedes.

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I understand that the A5000 can be upgraded with an extra Memc chip. Is this possible on my machine and do you know of any companies who have plans for 8Mb boards?

Jonathan Dyer
Nottingham

A **It can't be done. There are a number of 8Mb upgrades around for A400 series machines, such as those from Atomwide, Watford and Gnome. There is also one available from Risc Developments, tel: (0727) 840303, for the A5000.**

These replace the computer's existing memory controller (Memc) chip with a connection to a circuit board holding sockets for two Memc chips and an additional 4Mb of Ram.

However, on an A4000, A3010 or A3020, this controller is internal to the Arm250 processor and cannot be removed, replaced or connected to anything else.

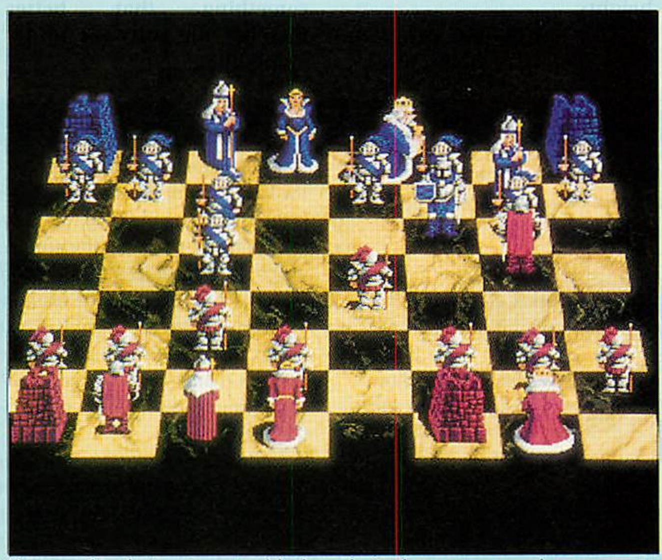
Don't despair; upgrading to 4Mb may be more help than you think. It is likely that hundreds of kilobytes of memory on your machine are being used by the system for things like font cache, RMA, printer driver and so on. Since these resources can be shared by several programs at once, an extra 2Mb will more than double the space available to your applications.

STAR QUESTION

Q I am writing a *Scrabble* program for the Archimedes and would like to release it as Careware. Would it be infringing anybody's copyright if I did so?

Jeffrey Almeida
Leicester

A Not 'alf! I talked to Spears, which owns *Scrabble*, both as a game and a trademark, and they would be distinctly unamused if someone were to release their own version. The company didn't think US Gold, which holds the software licence, would be too happy either. Apart from the financial side, they're both keen to protect the standard appearance and high quality of the product. It's OK to implement software versions of traditional games like chess, many card games, nine mans' morris and so on because their authors, if any, are far too dead to worry about royalty cheques but, as Spears still has about 75 years left to run on its copyright, it isn't about to give licences away.



You can do what you want with chess, but other games may have owners

Q I am a long-standing user of Acorn computers, and currently own a greatly expanded Archimedes 310 with extra memory, an Arm3 and Risc OS 3 fitted.

At the 1991 *Acorn User* show, I bought and then installed an ICS 40Mb internal hard disc. One of the features of this unit is a Powersave option which turns the drive off if left unused for more than a given length of time. I set this time to the minimum value of one minute and continued to use the machine.

At the 1992 *Acorn User* Show, I talked with another hard drive manufacturer and was informed that they did not intend to implement a Powersave feature, since continually turning the hard drive on and off can lead to its premature failure.

I asked ICS about this, and they confirmed that hard discs do have finite lives, recommending that resetting the delay to five minutes would limit wear and tear. I have since discussed this problem with a computer service engineer who says he's never heard of hard discs failing because of them having to endure too many start-ups.

With all this conflicting advice on the matter, I find that I am now not using the Powersave feature at all. Can you clarify things for me?

Terry A. Ellis
Ivybridge, Devon

A **This is essentially a problem in physics. A hard disc is a wheel spinning at several hundred rpm on an axle bearing. Wear and tear during starting and stopping is much greater than during continuous rotation because of additional friction when the wheel speeds up and slows down.**

The same problem causes car tyres to lose more rubber during acceleration and deceleration than they do when a car moves at a fixed speed. In principle, therefore, turning the hard disc on and off at all is going to contribute to its eventual demise, and it's my experience that fixed discs do tend to crash when you turn them on first thing in the morning, rather than when you're in the middle of something.

Having said all that, leaving the disc running forever will also cause the bearing to fail, albeit at a slower rate. These days, hard discs are built to handle many more 'duty cycles' than they used to. Modern units, particularly those designed to save power on portables and 'green PCs', are actually designed for a long life of frequent stops and starts.

Typically, laptop hard discs power down five minutes after use and save a lot of battery power without, apparently, causing premature senility in hard discs.

ICS says it has had no problems with this feature on its drives but it will, of necessity shorten their theoretical life expectancy. In any case, a one-minute delay before shutdown does seem a little short.

If you use the computer to run games, for example, simply calling a program and running it for hours before you next use the disc, then a five-minute shutdown could be economical. If, however, you're word processing and saving to hard disc every 15 minutes, then this option seems hardly worth the bother. By the way, if you abandon this feature altogether, your hard disc will still fail one day, so keep backing it up.

Q When I use the PC-emulator in EGA or VGA mode, some PC programs only fill a quarter of the screen. Why is this? Is there any way I can make it use the whole screen?

J. Howe
Gateshead

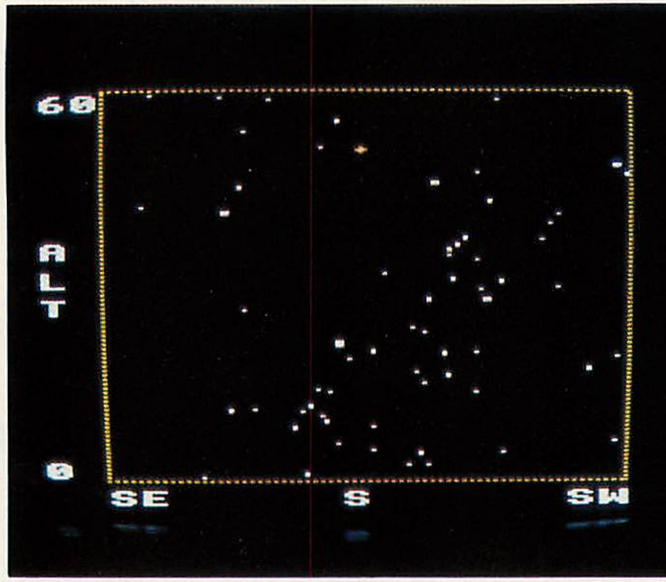
A **Like the Arc, PCs have many screen modes. It's not just a question of which graphics adaptor you emulate (Hercules, CGA, EGA, VGA, Super VGA, XGA and so on). Each of these offers several display options which vary in resolution (number of pixels) and number of colours.**

Most PC modes are 640 pixels across, so let's take this as an example. When you run a PC program on your Arc, the screen is 'mapped' to the first 640 pixels across the window. If the desktop on your Arc happens to be in Mode 12 or 20 (also 640 dots wide), the emulator window will fill the width of the screen and all of the PC screen, except the bit under the window frame, will be visible. In a mode 16 desktop (1056 dots across), the same 640 pixels will only occupy 61 percent of the screen width.

Conversely, if you use a Mode 2 desktop (160 pixels wide), though goodness only knows why you should, the window will only hold a quarter of the PC display at one time. Similar problems occur with conflicting heights.

If a particular program does not fit your screen, there are two things you can do. First, many PC programs can be configured for different IBM screen modes, so you can try resetting the program to an EGA or VGA mode that is more appropriate to your desktop.

Failing this, you can use *Configure WimpMode to change the desktop mode to something that better matches the software under emulation.



Eight-bit astronomy is still very much alive and well

Q I have recently taken an interest in astronomy. Is there any software that covers this subject for an eight-bit machine (Master series)?

K.L. Shenton
Stoke on Trent
Staffordshire

A **There's a fair amount of astronomy software about for the Beeb, particularly in the educational sector. This includes simulations of planetary motion, adventures and key datafiles aimed at project work.**

Probably the most interesting astronomy programs are those which plot maps of the night sky like those published each month in *The Times*. The beauty of using a computer for this is that rather than working from a general map for a whole month in London, the machine generates an accurate image for a precise time and place.

Check out *Starmap* from Heinemann which is listed, along with ten other astronomy programs for various formats, in AVP's *Big Black Catalogue*. You can contact AVP on (0291) 625439.

CUSTOMER HOT LINE

Every month in BAU, Alan Glover from the Acorn customer service department offers you Acorn's advice and support

MANAGING OUTLINE FONTS

The Outline Font Manager is provided as standard with Risc OS 3, and can be used with Risc OS 2, although it is not a part of the built in OS Rom.

There are a number of configuration settings available which allow you to tune the performance of the Outline Font Manager to best suit the way that you use your system.

It is important to ensure that an adequate amount of space is allocated for the font cache. This is an area of memory used to hold font data within the computer's memory rather than having to go and fetch it from disc each time it is needed. The initial size of the area after a reset/power on can be set with *Configure FontSize <number>K (or by using *Configure*). Even if you only make minimal use of fonts, you should always ensure that there is some font cache available to the system. The optimum setting to use depends upon the degree to which you use fonts.

A useful yardstick is to put aside around 64K to 128K per megabyte of memory in the computer so, on a 2Mb machine, the setting would be between 128K and 256K. The maximum setting is 1024K. Intensive font users may wish to use 256K per megabyte instead.

However setting the size of the font cache is not the end of the story. The next decision to make is where to place the tradeoff between high quality anti-aliased characters and memory consumption/performance.

Anti-aliasing consists of determining how much of a character outline occupies a given pixel. This information is used to choose a colour between the foreground and background colour to represent it (this is typically a range of greys between black in the foreground and white in the background). The result of this is that characters will look much less jagged and more pleasing to the eye. However, calculating anti-aliasing takes time, so there is a tradeoff to be made. You can also decide at which size of character anti-aliasing should not be used since the character has become large enough not to require anti-aliased pixels.

These settings are controlled by the five FontMax configuration values. Risc OS 3 users may alter them by using *Configure*. Any Risc OS user can change them by pressing F12 and typing 'Configure FontMax<n> <value>'. <n> is the fontmax number (1-5) and <value> is the point size.

Fontmax2 and FontMax3 (described as 'Use anti-aliasing for characters' and 'Use cached bitmaps for characters' in *Configure*) jointly set the maximum point size of character which will be drawn using anti-aliasing. If the point size used is larger, it will be scaled directly from the outlines without being anti-aliased. Set both of these to the maximum point size that you want anti-aliasing to be used with.

Note: The above is a great simplification of the real situation; those interested in reading further should consult the *Risc OS 3 Programmer's Reference Manual.*

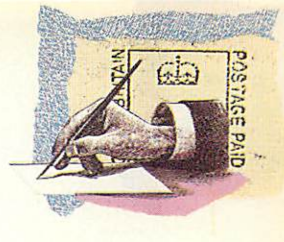
POCKET BOOK AND A-LINK

The Acorn Pocket Book A-Link reviewed in last month's BAU, allows you to transfer data between a Pocket Book and an Acorn 32-bit computer, and consists of a hardware link and a software application which runs on the 32-bit workstation.

However, because A-Link has advanced features which aim to make it easy to use it needs Risc OS 3 (Version 3.10 or later). This is provided as standard with new A3010, A3020, A4000, A5000 and A4 computers, and is available as an upgrade to existing Archimedes owners.



Art Works
Clip Art
COMPETITION
We are running a graphics competition, open to everyone who has a copy or has access to a copy of ArtWorks
Any type of drawing or illustration is acceptable. It could be purely illustrative, a technical drawing, a company logo or practically anything created with ArtWorks.
You do not have to have any great technical or artistic skill. A simple but visually pleasing design is just as likely to be a winner as a complicated technical illustration.
And don't be put off if you think you are not artistic - you can still win. ArtWorks means that with patience anyone can create good drawings. After all, the ArtWorks apple was created by someone with hardly any artistic ability (the MD!) - just the patience to experiment and of course a copy of ArtWorks that is forgiving enough to allow him to undo his many mistakes.
If you don't enter you can't win. The first prize is a Canon A3 full colour printer worth nearly £1750, and there are many runner-up prizes. In fact every entrant gets a £10 discount voucher, so everyone wins something.
If you have any artwork produced using ArtWorks then simply send it to Computer Concepts. If you want more details or an entry form then just ring and ask on the number below.
BOSS
HUGO BOSS
EAU DE TOILETTE
NATURAL SPRAY
Computer Concepts Ltd
GADDESDEN PLACE HEMEL HEMPSTEAD HERTS HP2 6EX
TEL: 0442 63933 FAX: 0442 231632
HURRY!
COMPETITION CLOSES 30th APRIL 1993



£15 STAR LETTER

I am at the moment a subscriber to your magazine, and I have got complete sets of every volume published. I get enormous pleasure reading through all the back issues, but sadly I am still a BBC B owner and I must say I cannot understand how or why you call yourself a Beeb magazine.

If you cannot improve on the coverage you have at the moment, perhaps you could do yourselves a favour by publishing programs from magazine discs a few years back when you really did support the Beeb, long before this new fangled 32-bit stuff came along. Your comments would be most appreciated; thanking you for the support that we once enjoyed.

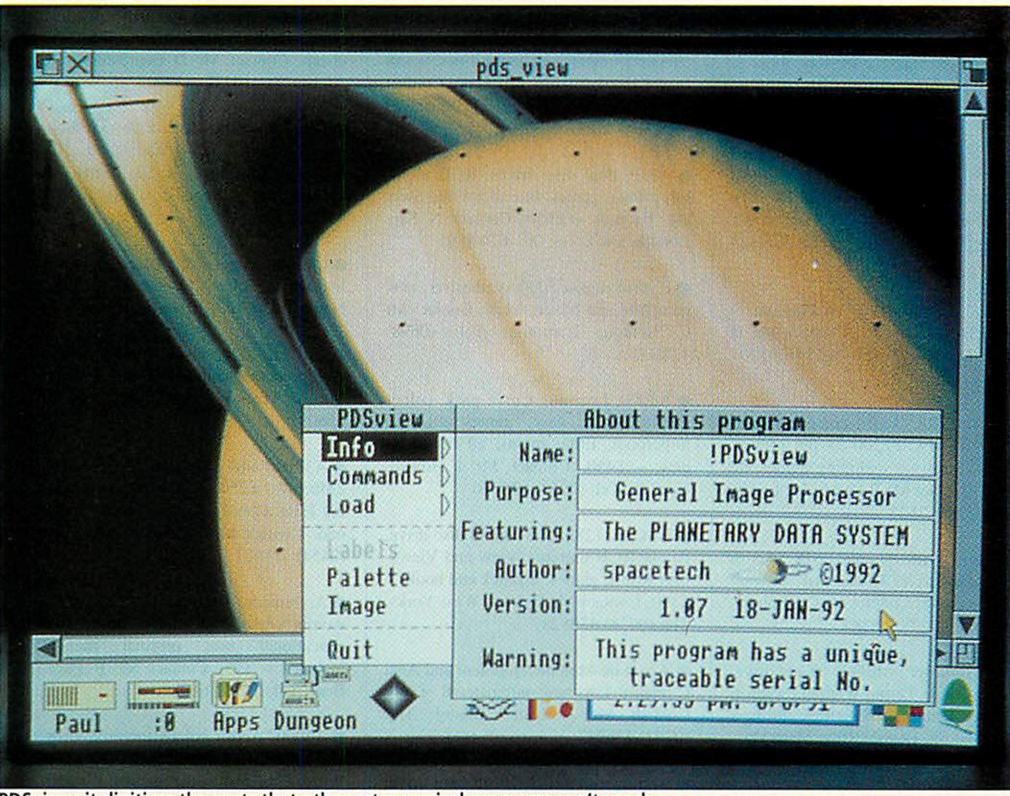
T Parsons
Bedfordshire

I think it's time for us to bite the bullet as far as all you eight-bit owners are concerned. Consider the situation:

- **There are virtually no new products released for the eight-bit range.**
- **The fact that the eight-bit technology has been around for nearly 12 years means that there are precious few original ideas floating around these days.**
- **The vast majority of our readers use 32-bit machines as their main machines (although a lot of them still have eight-bit machines).**

There's no getting away from the fact that there is far more to say about the 32-bit range, but that isn't the only reason for our lack of eight-bit coverage. The problem is that we are sent almost no programs for the Beeb, and therefore we can't publish much for the old machines.

So here is the solution. Send us your contributions and we will publish them. There are still a lot of eight-bit users out there, and the Master is still sold as a new machine, so don't leave us in the dark. We still want to publish software for the eight-bit range, but we need your input.



PDSview: it digitises the parts that other astronomical programs can't reach

CONFIGURE KILL

In response to Ralph Edwards' letter in the March 93 issue, I would like to offer the following advice. In order to disable the 'little angels' from using the *Configure* application, simply press F12 and type *Unplug Configure to remove the Configure module. A less permanent way is to *RMKill the module, say from a boot file. For both methods the module can be reinstated by typing *RMReInit Configure.

Mr Edwards also asks about the scrap directory. A way of getting round his problem is to use the Ram disc as the scrap directory. To set up the Ram disc in this way, simply copy the *Scrap* application into the Ram disc and double-click on it. In this way his application discs can be write protected.

On the third point about the Applications folder appearing on start-up, this must be due to having a command in the boot file which opens up the directory. To prevent this from happening, he should edit his boot file and remove the line which says Filer_OpenDir Resource:$.Apps.

I McLaren
Edinburgh

Many thanks to Mr McLaren and all those who sent in replies to Mr Edwards' letter. A couple of other points which were raised by readers were:

- **You can unplug any of the Rom applications by using (for example) *Unplug !Draw to remove the relevant modules.**
- **To remove the whole Apps folder from the icon bar, type *Unplug ResourceFiler.**

ANOTHER STAR LETTER

Please pass my thanks on to Fin Fahey for *SkyWatcher* in the March issue of Acorn User. This would be a really incredible piece of software if, when you zoomed in on well known planets, a few details of the planet were given; perhaps they could be digitised.

R Fairburn
York

You may be interested in *Orrery* or *PDSview*. Both contain digitised details of the planets, as well as much, much more. *Orrery* was reviewed in March 91, and *PDSview*, August 92. Contact Spacetech on (0305) 822753 for more details.

FORTRAN LIVES!

I was glad to find a fellow believer (N Ellis, Q&A October 92) who thinks the Arc is a great tool for numerical and scientific programming. But why is he thinking of spending £200 on a C compiler when Fortran programs to design optical systems have been around for 30 years?

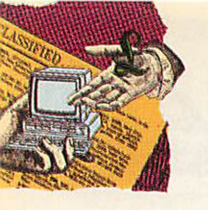
Why not just transport these? It would be significantly cheaper to buy Acorn's Fortran 77 compiler, and Archive's Shareware 44 disc, which contains a Desktop Development Environment front end and libraries.

K Crennell
Oxfordshire

WAIT AND C

In March's letters, you mentioned that Acorn were looking at Cfront 3.0. I am currently porting the GNU C/C++ compilers to the Arc, and hope to have these ready soon. I am looking for beta testers; if any of your readers are interested, please write to me, at the address below.

S Callan
2 Malden Road
Borehamwood, Herts



FREE ADS

● Electron 64 k Turbo, Plus 3, Plus 1, sound expansion, games, View, Viewsheet, books, mags, plus lots more – £200 ono. Contact Mr A Gilfillan, Nottingham. Tel: (0602) 617529

● Scsi interface and 47Mb Worru Winnie (Oak) external hard drive for most machines, excellent condition, rrp £550+, selling for – £450. Contact Mr N Piggott, Longsight. Tel: 061-225 5312

● Acorn Cambridge Workstation – offers? Buyer collects. Contact Mr D Ingles, Lancaster. Tel: (0524) 65201 x2325

● A3000, 2Mb, Acorn colour monitor and stand, NEC P2200 24 pin printer, manuals, software including games etc – £750. Contact Mr B Parkhurst, Leeds. Tel: (0532) 757523

● Electron with Slogger 64k, Acorn Plus 3, disc drive, 34 discs of software – £110 inc p+p. Contact Mr C Oliphant, Kent. Tel: (0227) 368287

● BBC Master, 40/80 disc drive, mouse, Quest, Paint, Wapping Editor, SuperArt, Dumpout 3, games, utilities, twin joysticks, Logo, Office Mate/Master – £300. Contact Mr G Davison, Coventry. Tel: (0676) 34853

● BBC B, immaculate condition, sideways Rom board and many Roms, twin 5.25in 80 track disc drives, Philips mono monitor, other accessories, software, manuals – £200. Contact Mr J Rayfield, Bucks. Tel: (0753) 653466

● A310 Watford Electronics 2Mb Ram upgrade (plug-in) – £75. Contact Mr M Glass, Huntingdon. Tel: (0480) 434184

● Master 128 with internal second processor, dual 40/80 disc drives, modem, green screen monitor, View, Viewsheet, Viewstore, Interword, all manuals and many discs and magazines – £350 ono. Contact Mr G Banyard, Harrogate. Tel: (0423) 870978

● BBC B, colour monitor, recorder, twin drives, Watford Rom/Ram board (full), Replay, Teletext, manuals, books, games, excellent condition, boxed – £325. Contact Mr I Twisleton, Northampton. Tel: (0604) 845257

● Master 128, 40/80 twin drives, colour monitor and swivel base, Quest Rom and mouse, some disc software – £375 ono. Contact D Shilladay, Selby. Tel: (0757) 705558

● A310 basic model, software includes Graphics Writer, Logistics, Artisan, PC Emulator and games plus programmers reference manual – £350. Contact Mr G Cutting, Herts. Tel: (0923) 856663

● A410/1, 2Mb Ram, colour monitor, 40Mb hard drive, internal 3.5in disc drive, 5.25in drive and interface, hand scanner, Impression II – £1000, Panasonic KXP1124 – £125, all excellent condition. Contact Mr M Shields, Cheshire. Tel: 061-973 1894

● Master 128, boxed with 40/80 double sided disc drive, wordprocessor, Spell checker, spreadsheet and utilities, worth over £550, bargain – £250 ono. Contact Mr P Winter, Surrey. Tel: (0372) 452036

● A310, dual disc drives, RGB monitor, printer, games, Interdictor and Swiv etc, bargain – £650. Contact N San, London SW4. Tel: 081-674 8895

● Hybrid music 5000 synthesiser, new complete and boxed – £70. Contact Mr C Benton, Hamilton. Tel: (0698) 428907

● A3000, Learning Curve pack, colour monitor, disc case, games such as Superpool, Elite, extras, all boxed as new – £450. Contact Mr J Howell, Norfolk. Tel: (0953) 605640

● BBC B, 128k DFS, 40/80 disc drive, colour RGB monitor, View and Viewsheet Roms, games, joystick and books – £300. Contact Mr D Stott, West Yorks. Tel: (0924) 430828

● Acorn desktop development and Ansi C release 4, as new unregistered –£160. Contact Mr J Evans, Bristol. Tel: (0272) 736237

● Archimedes 410/2, 20Mb hard drive, 2Mb Ram, external 5.25in floppy, manuals, software, boxed – £775. Contact B Sharrock, Westhoughton. Tel: (0942) 815952

● BBC B and single disc drive, tape deck with Watford DDFS board, Basic II, Wordwise, Watford DFS and discs – £115. Contact Mr N Johnson, Lancs. Tel: (0282) 413596

● BBC master 512, Gem software, disc drive, monitor, all manuals – £350, new unused Star LC/20 printer – £85. Contact L Blackburn, Severn. Tel: (0299) 824476

● Risc Os 3.1 for A3000 (ALA 31), unused – £40, also Acorn DTP – £30, PC Emulator (V1.7 Dr Dos 5) – £50, 1st Word V2 – £25, unused. Contact Mr G Wallace, Inverberue. Tel: (0561) 62452

● Integrex colourjet 132 printer, for high quality colour work (cost £700+) – £320 ono. Contact Mr M Wilson, Somerset. Tel: (0935) 25974

● Scanner, Watford AHS-3, 16 greyscale for A3000, little used, complete with manual – £110. Contact A Singleton, Kent. Tel: (0580) 753431

● Wanted: Book 'Lisp on the BBC Microcomputer', in good condition please. Contact Mr A Milne, Aberdeen. Tel: (0224) 742234 after 8pm and weekends

● Master 512, green monitor, 5.25in and 3.5in disc drives, Panasonic KXP1180 printer and stand, Accelerator, Dumpout 3, manuals for everything, games – £550. Contact Mr G Cranch, Bath. Tel: (0225) 314126

● Wanted: Printer for BBC B, any other Beeb related items, must be cheap. Contact Mr D Beardsmore, St Albans. Tel: (0727) 839908

● BBC B, 40/80 disc drive, joystick, colour monitor, cover and stand, 50+ discs, all manuals – £150. Contact P McLaughin, Sevenoaks. Tel: (0732) 450650

● Complete set of Electron User magazines – offers. Contact R Harrison, Notts. Tel: (0777) 703601

● BBC B, 32k, Issue 7 with View, wordprocessor chip – £85 ono. Contact Mr A MacEod, Herts. Tel: (0279) 656082

● A3010 Family Solution, upgraded to 2Mb, over £250 of free games including Elite, Chocks Away, a cool – £450 ono. Contact Mr J Black, Avon. Tel: (0454) 418627

● Archimedes Pendown – WYSIWYG wordprocessor, ideal for home and educational use, original manual included – £25. Contact Mr B Page, Beds. Tel: (0767) 680890

● A3000, Acorn colour monitor, original manuals and application discs, 1st Word Plus and some games – £450, Star LC 10 printer – £75. Contact Mr M Steward, Huddersfield. Tel: (0484) 654368

● 5.25in disc drives, two Acorn double drives – £38 each, one Acorn single drive – £25 ono. Contact R Goodyear, Rothwell. Tel: (0536) 712370

● BBC B, DFS, 80/40 dual drive, double plinth, colour monitor ono – £250. Contact Mr J Jones, Surrey. Tel: (0372) 378135

● A3000 base, 2Mb Ram expansion, new 20Mb IDE, handscanner TV Modulator, joystick interface, five games, original manuals and application discs – £650. Contact M Beezh, Watford. Tel: 081-428 7399

● BBC B, green screen monitor, NLQ 9-pin printer, 40/80 dual disc drives, manuals, wordprocessors including View A3.0, magazines and software – £200 ono. Contact Mr P Mitchell-Gears, Surrey. Tel: (0737) 556863

● A3000 C development system – £60, original BBC B games, hardly used, 40/80 disc drive, all – £25, UIM, Thrust, Citadel, Graphic adventure Creator. Contact Mr P Bussey, Beds. Tel: (0582) 459535

● A310, 40Mb hard disc, 2Mb Ram, Mem C1A, new keyboard, twin Editor, books some software – £350. Contact Mr A Duplain, Brighton. Tel: (0273) 738913 eve

● A3000, 2Mb Ram, Risc Os 3, joystick interface and joystick, colour monitor, Learning Curve, games, lots more – £750. Contact Mr D Kirkham, Tyne and Wear. Tel: 091-253 1883

● Master 128, LC200 colour printer, colour screenprint Rom, Music 5000 synthesizer, colour monitor, 5.25in disc drive, software and manuals – £530. Contact B Wright. Tel: (0279) 655778

● Watford CDPM800S twin 5.25in 800k double sided 40/80 disc drives with power supply unit in plinth – £75. Contact Mr R Young, Middlesex. Tel: 081-427 4039

● Master 128, single 40/80 disc drive, mono monitor, mouse, software, books – £250, Spellmaster Rom – £20. Contact Mr A Stevens, Gosport. Tel: (0705 528296

● A5000, 4Mb 80 hard drive, Risc Os 3.1, Learning Curve, hardly used, excellent condition, reluctant sale – offers please. Contact Mr R Reed, Surrey. Tel: (0784) 434927

● Good Impression – DTP book with three discs, only – £15, All in Boxing – £5. Contact Mr A Howat, Merseyside. Tel: (0704) 63344 eve only

● A3000, Acorn colour monitor, 2Mb Ram, mint condition, still under GTTE – £500. Contact Mr S Hewitt, Clwyd. Tel: (0492) 545533

● A410/1, 4Mb Ram, 20Mb hard disc, colour monitor, Arm 3, Risc Os 3, floppy interface, 9 pin dot matrix printer – £1000. Contact Mr I Stewart, Liverpool. Tel: 051-734 5989

● Dr Dos 512k board for BBC Master (or BBC B with expansion box), including Gem, manuals etc – £75. Contact Mr Newmans-Brown, Bedford. Tel: (0234) 856070

● Wanted: Laser Direct interface board by Computer Concepts or Calligraph for Canon LBP-4 laser printer, also required Archimedes software and accessories. Contact Mr N Duffield, Coventry. Tel: (0203) 445174

● Programmer's reference manuals for Archimedes Risc OS 2, boxed, good condition – £30. Contact Mr D Wright, Leeds. Tel: (0532) 439736 after 6pm

● Master 128k, Microvitec colour monitor, Cumana 40/80 disc drive, AMX mouse and SuperArt, games – £300 ono. Contact Mr W Dixon, London N1. Tel: 071-266 2011

● Watford double sided 3.5in disc drive without power supply unit – £25. Wanted: Winchester hard drive for Master 128. Contact J Lampard, Wilts. Tel: (0722) 331442

Due to a mighty backlog of free ads, there is no coupon this month. Please do not send in any ads until the coupon reappears. Until then no ads will be accepted.



PROGRAMS

The section that would never, *ever* step on anyone's blue suede shoes

I'm down. Totally low. Not your normal Monday morning kind of down, though, oh no; this is the sort of feeling that would make a Chicago bluesman sing zippa-dee doo dah.

It's not even my fault, really. I've been having problems with my suite of rock 'n' roll personality simulator programs, which I've been working on for years now. They've been looking so promising, but who would have thought that disaster would strike all of them at the same time?

Take my Elvis simulator, for example. The program's been growing and growing steadily over the last few years, and this week it's become so huge it simply won't fit into my machine; *No room at line 4530* is all I can coax from the King, which is hardly going to break hearts all over the world tonight, is it?

Then there are Marc Bolan and Buddy Holly, who've just both crashed horribly. And as for my Freddie Mercury simulation, well I don't want to talk about him. Let's just say that's the last time I forget to install Pineapple's *Killer* in my boot sequence. . . †

So, is there anything that could cheer me up? What about this month's programming section? Is this the answer to all my troubles?

First up is a trip down memory lane for all those who should be old enough to know better. Remember the days when the word Thatcher conjured up a quaint profession, something to do with country cottages and straw roofs, and an *annus horribilis* was simply what happened after a very hot curry? Then you'll remember *Pong*, the second commercial computer game of all time.

Thrill at the graphics, marvel at the sound, wonder how on earth we've managed to squeeze such complicated mathematical algorithms out of a humble Arm processor! Doesn't take long to realise that all these young pretenders in the amusement stakes, like *Swiv* and *Aldebaran*, are in fact indebted, in their progress up the evolutionary ladder, to the accomplishments of the simple *Pong*.

Still, if you think maybe, just maybe, you could improve on the demi-god that goes blip-beep-blip, then you'll be thrilled by the final instalment of our Games Designer series. This month we present a complete game, created entirely using the tools described over the last four parts.

Assembly Line summarises everything that's been covered since it started, way back in February 1992. Arm instructions, conditional codes, branching, transferring data, stacking, recursing; it's all here. Next month sees the end of the series with a round up of all those queries you've been plaguing us with.

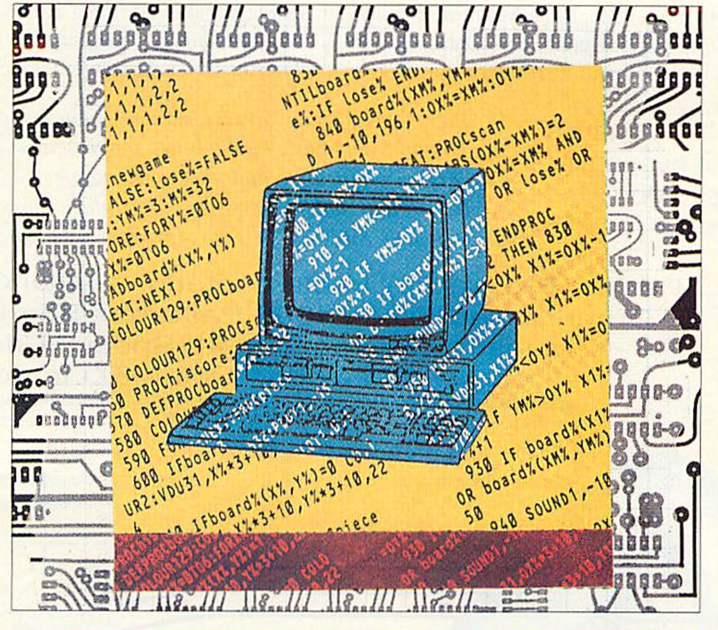
Rocky Trade is our complete game, created with the Games Designer. Remember *Rocket Raid* on the Beeb? Well, now you can play it on your Arc in glorious 32-bit technicolour, and you can edit it too.

Last, but definitely not least, ✱INFO is enough to make Marvin the Paranoid Android smile. Variety is the spice of life, and this month it's like condiment heaven. If you can't find something to tickle your fancy here, don't call us.

Ah, that's better! I feel almost human again. Nothing like a great selection of exciting programs to cheer the soul of a disillusioned programmer. Anyway, Elvis always was a bit too portly for his spangled suits. I feel almost cheerful enough to start work on my John Lennon simulator. Can't see there being any problems with *this* one. . .

Mark Moxon

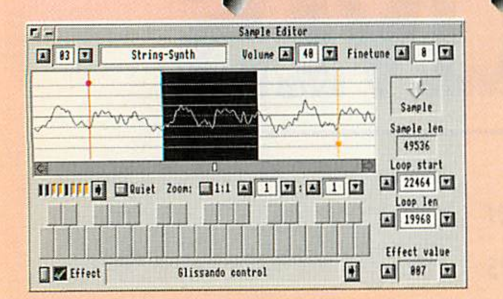
† If you have any queries regarding safe programming practices, please call Pineapple on 081-599 1476.

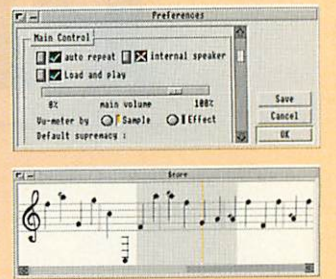


CONTENTS

Digital Symphony

The Definitive SoundTrack Editor





Built in Sample editor, allows you to Cut and Paste parts of the sample. You can try out any of the 40 different special effects, and define a repeat loop by dragging visual markers.

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The Pattern Editor, used in conjunction with the Musical Notation score display, makes editing a track very easy. Once created each pattern can be slotted into the sequence, wherever you wish. Cut and Paste, Copy, Transpose, Exchange, etc... facilities are offered to enhance flexibility.

...but we are not alone in thinking that Digital Symphony is the best ever music sequencer for the Archimedes. Read what Richard Hallas of Risc User said. - Apr 93

- *"Every aspect of the program's implementation, and presentation is very polished, and classy."*
- *"Digital Symphony's facilities are sophisticated, extensive, flexible, and easy to use."*
- *"It is very difficult to fault this excellent piece of software. The facilities couldn't be better, and make it very easy to produce music quickly."*
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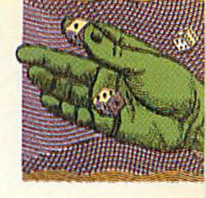
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Family Cat
Areas Most of Asia
Status Declining Numbers
Notes Distinctive Stripes
Good Swimmer
Normally Nocturnal

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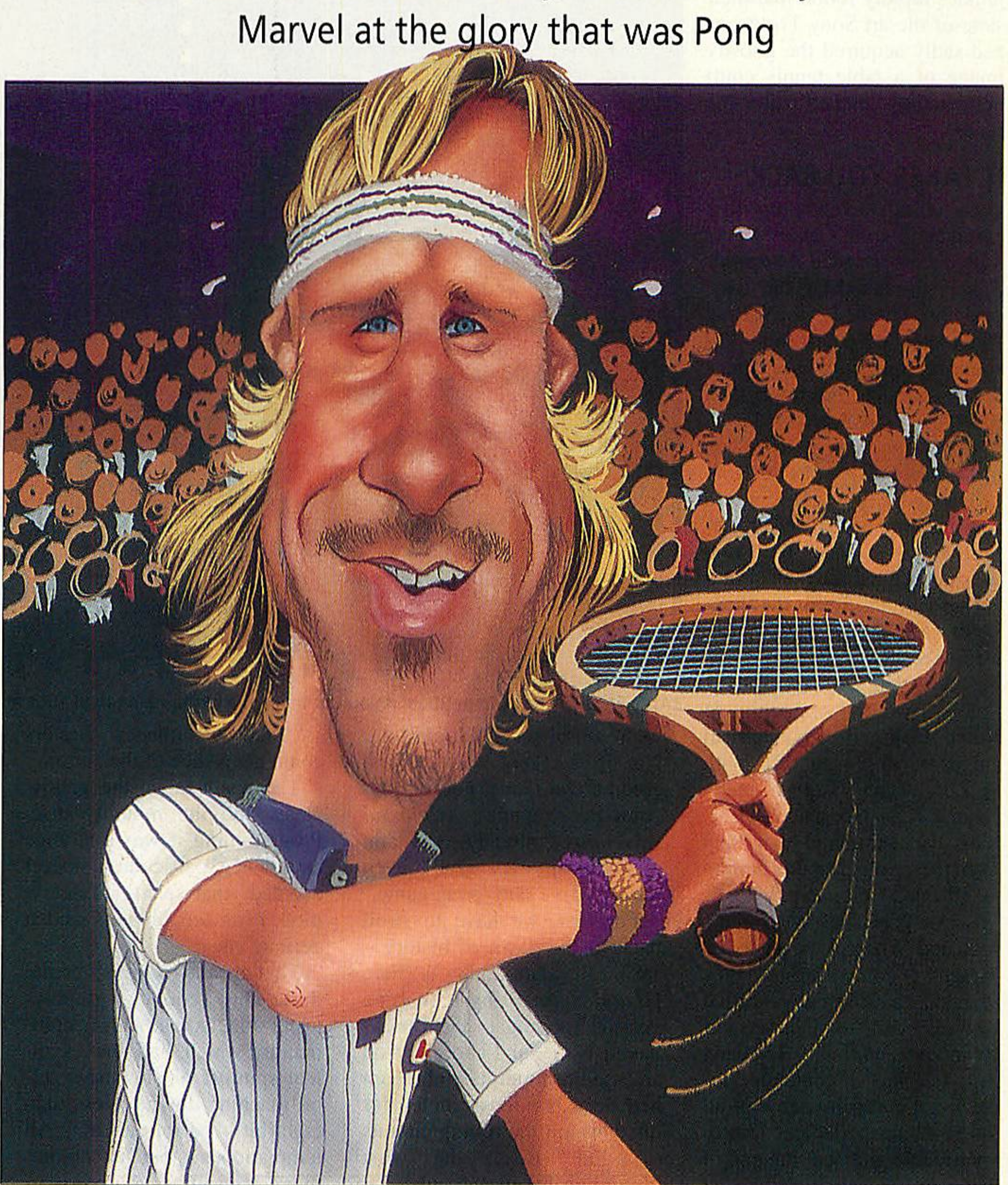
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BJORN AGAIN

You can learn a lot from history, or so Fin Fahey reckons. Marvel at the glory that was Pong



MARK DRAISLY

History is replete with examples of ideas whose time has come. The printing press, quantum physics, double-entry book-keeping: all innovations that shattered conventional cultural and scientific paradigms.

Twenty years ago this year human minds were sent reeling by the appearance of an entire new technology that would deeply alter the lifestyles of millions of consumers.

That apparently innocuous product appeared under the humble name of *Pong*, the world's first successful commercial video game. It is hard to believe, but prior to 1973 computers were used only for trivial small-scale applications like defence, corporate book-keeping and scientific research.

All the life-enhancing aspects of computer technology that we take for granted these days – zapping aliens; pretending to be Fatima Whitbread; software piracy – were denied to the world prior to *Pong*. Hell, in those days people thought a joystick was something you burned to make your groovy crash-pad reek of patchouli oil, and a pixel was a Cornish fairy.

It's not easy to visualise the excitement that gripped a punter on first encountering *Pong*. In 1972, what you expected from a TV tube was passive entertainment, but this thing fought back; perhaps there some demon in there.

The first *Pong* was quite simply a no-frills two-person table tennis game. It offered a classic purity of concept; a black-and-white no-resolution display with two little knobs on the front, one for each player.

Game interaction was simplicity itself; you dropped in your shilling, dime or whatever, twiddled the knob and a short, thick vertical line moved up and down the screen. This enabled you to deflect a tiny, rapidly moving dot in the direction, hopefully, of the other person's goal; then it was their turn.

But to the computer-starved world this was sufficient; no-one could get over the idea of a TV set that responded to you. Interactive video was born, laying the foundation of a leisure industry that is now worth billions. *Pong* was also strangely addictive, the touchstone of a true computer game. Although pong-playing was necessarily defensive in nature, true *Pong* Jedis were rapidly to emerge.

To start with, computer-naive punters would simply spin their bats (paddles) up and down the screen in an effort to create an impenetrable wall. A good player, however, developed an uncanny ability to compute trajectories and anticipate the optimum intersection point of paddle and ball. This is the sort of skill that us modern game-players take totally for granted. Added to this was the use of backspin, the game's most advanced feature.

This meant that you could faze out your opponent by clobbering the ball with a moving bat, altering its course and speeding it up. Variants of *Pong* rapidly multiplied and when computer entertainment rolled out of the arcades and into the home, *Pong* was in the

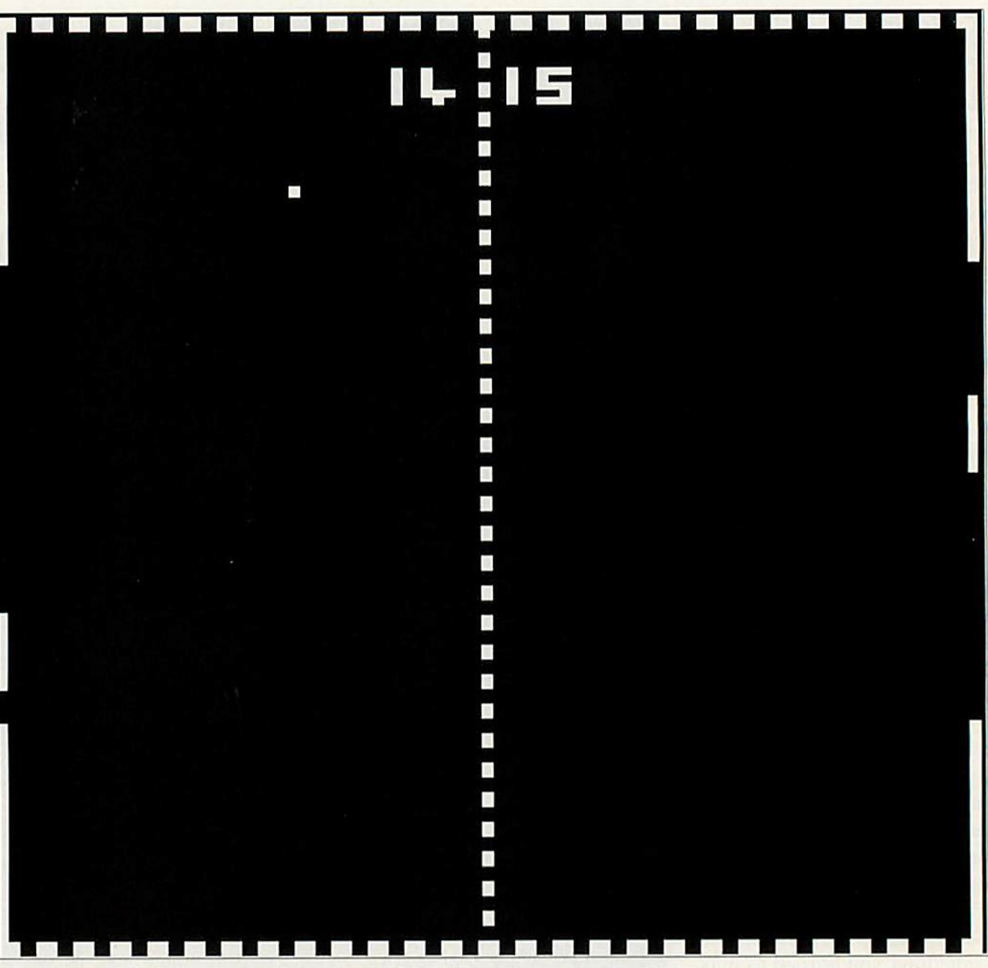
first wave. The mid-1970s console boom was initially lead by machines that were little more than home *Pong* consoles: little boxes with two knobs on.

The game may have led, in fact, to the introduction of the screen blanker; keen *Pong* junkies rapidly found that their state-of-the-art Sony Trinitrons had sadly acquired the ghostly image of a table tennis court permanently etched into the screen.

IT TAKES YOU BACK

Pong wasn't actually the first commercial video game. It had a predecessor called *Computer Space*, marketed by the curiously named Nutting Associates of California. For some reason, *Computer Space* didn't catch on, and fewer than 3,000 machines were made.

Computer Space lived on for a while as a console Rom called *Space War*. This was a very peculiar result since *Computer Space* was the first shoot-em-up; since then shoot-em-up variants are in the thousands and Pong has begat, well, *Breakout*, *Arkanoid* and, well, like that.



BAU's Spot The Ball competition; if you can think of a better name than Spot for this ball, you've got a problem

Pong was the brainchild of Nolan Bushnell, an electrical engineer who, together with his colleague Ted Dabney, created it in November 1972. It is also rumoured that they were the original brains behind the ill-fated *Computer Space*.

Some years before Apple's Jobs and Wozniak popularised garage computing, they founded a company called Syzygy with total assets of about five dollars. Realising that this was a contender for the worst company name of all time – unspellable, unpronounceable and near the end of the alphabet – they changed it in short order to . . . Atari.

Then came *Pong* and the money came rolling in, enough so that Bushnell could sell the infant Atari to Warners for $30 million in 1976. Considering the company's current problems, that may be seen as very prescient indeed. Bushnell, however, was done with home entertainment.

He was last heard of running a fast food chain called Pizza Time Theatre that featured a giant rat called Chuck E. Cheese as a mascot. While we're on history, that ain't all. No sirree. *Pong* was the first commercial game, not the first computer game (*Colossal Adventure* already ran on mainframes). It wasn't even the very first ping-pong game.

For that, we have to stroll back to the dawn of history – 1958 – when one William Higinbotham, a physicist, got a version running at the Brookhaven National Laboratory on an oscilloscope. Higinbotham had been previously noted for his work on the timing circuits of Fat Boy, the first plutonium-based A-bomb.

Finally, *Computer Space* itself had antecedents ranging back to 1972, when *SpaceWar* appeared at MIT, running on a PDP-1, a supercomputer of the time with an awesome memory of 9K.

THE FUTURE IS HERE

Gripped by a profound nostalgia and having long since given away my last 1975-vintage Philips games console to a luckless niece (cheap birthday present), I decided to recreate the 1973 megagame so that Archimedes punters could get a slice of the action.

The result is on the yellow pages and the monthly disc. Programming it was a strange experience, particularly since I decided that using Teletext mode was too obvious and a definite cheat.

That meant trying to create those big chunky graphics using RECTANGLE FILL commands, which had the excellent spin-off of slowing a 32-bit machine down to less than eight-bit performance. All temptation to put in colour, nice scrolling messages, sprites, sample sound, high-score tables and so on had to be firmly resisted; harder than you think.

The result is probably not so much classic *Pong*, as *Pong* as I remember it; so if you've got better ideas, feel free to tailor the basic structure to your liking. I think the biggest problem is that, sadly, you can't get quite the right feeling with digital controls. What *Pong* really needs to do it justice is a couple of rheostats interfaced with a suitable analogue/digital podule. Perhaps some kind reader would like to supply a hardware solution?

Play is, of course, simplicity itself. Press a mouse button on the impressive title screen to start. Player one moves the bat up and down with the A and Z keys, player two uses Select and Adjust.

To leave the game, hit ESC. Each player starts with 15 points, and the first to zero loses. It just shows how far we've come; remember that the original *Pong* was written in machine code, and here we have a version written in an interpreted high-level language that has to be slowed down.

It almost makes you believe that realtime virtual reality is just round the corner. Almost. Beep-bloop-blip!

PRODUCT DETAILS

Product: Pong Console circa 1973
Supplier: Brick Lane, Arthur Daley or similar outlets. Alternatively, turn to the Acorn User yellow pages or to the subscriber's disc


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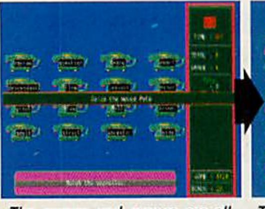
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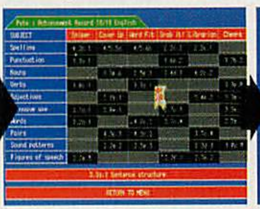
A brief demonstration of the 10 out of 10 English package in action.



The games and menus are all mouse driven and easy to use.



The Main menu: Start by selecting New Player.



Pete's achievement chart is now set-up.



The Game Menu – Pete is ready to learn!



Each game has its own achievement summary...

... and a high score table to add to the fun!

THE 10 out of 10 SERIES is an innovative collection of educational software. It covers traditionally accepted educational concepts and automatically records progress in a wide range of areas – all linked to the National Curriculum.

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Moving the mouse pointer around a chart you can discover exactly what a child will learn by playing a particular game at any grade. The achievement charts are automatically updated to record progress as the the six compulsive games are played.



Sniper: *Rearrange the words – with correct punctuation.*



Cover Up: *Match all the words with their opposites.*



Word Fit: *Fill the grid – but only use verbs!*



Grab It: *There are plenty of collective nouns up for grabs!*



Librarian: *Sort the books, then match the adjectives.*



Cheers: *Discover the meaning of sayings.*

THE SIX CHALLENGING GAMES in each *10 out of 10* package are designed to be played by a child alone, with friends or with you. Each game has six grades to cover a wide age range and include practise levels where appropriate – you can easily set many options to suit ability and taste too! You can even leave the child and return later to check progress.

Children work their way through the six grades of each game trying to turn the achievement chart green as they go. As an illustration, the screen shots below show a middle grade of each of the six games in the English package – suitable for children at Key Stage 2 of the National Curriculum (age about 8 to 11 years).

Remember, all the games have five other levels and many features – such as graphics and speed – can be easily customised by parents or teachers.This flexibility makes *10 out of 10* English suitable for all ages and abilities from age six to sixteen.



Children can print a certificate of achievement...



... and they love to see their name on the high score table!



By pressing R you can see the aim of the game at a glance.



Each game has its own achievement summary.

Pete : Achievement Record 10/10 English

SUBJECT	Sniper	Cover Up	Word Fit	Grab It!	Librarian	Cheers
Spelling	4.2b.1	4/5.5a	4/5.6b	2.2c.2	2.2c.1	
Punctuation	3.3a.1			3.6b.2		3.7b.2
Nouns		3.3e.6	2.5e.3	3.4d.3	4.2c.2	
Verbs	3.8c.1		3.3a.1			[illegible]
Adjectives		2.1b.1			3.4e.2	[illegible]
Language use	2.7d.1	2.8e.1		2.7c.3		3.5e.1
Words	2.2a.1		4.2c.1	3.7c.4		2.5e.1
Pairs		4.3c.1	4.3c.2		3.7c.4	
Sound patterns		2.2e.2	2.5e.3		2.3d.3	3.8c.9
Figures of speech	2.7e.5			2.2f.1	2.7e.2	

3.3e.8 Simple use of past tense

RETURN TO MENU

The achievement chart shows progress. By moving the pointer you can view a layman's interpretation of Curriculum numbers.

MOTIVATION & ASSESSMENT are provided in two ways: an **achievement chart** displays academic results and **high scores** show gameplay. The former records progress as the games are played:

RED means help needed. YELLOW means practise needed. GREEN means *10 out of 10*!

Now you can see where your child is not succeeding and use the various options to customise the games to help him or her progress more quickly. Children achieving 10 out of 10 in one or more grades can print a certificate – both on-screen and printed certificates are catered for. Children using the Early Essentials package are awarded stars too!

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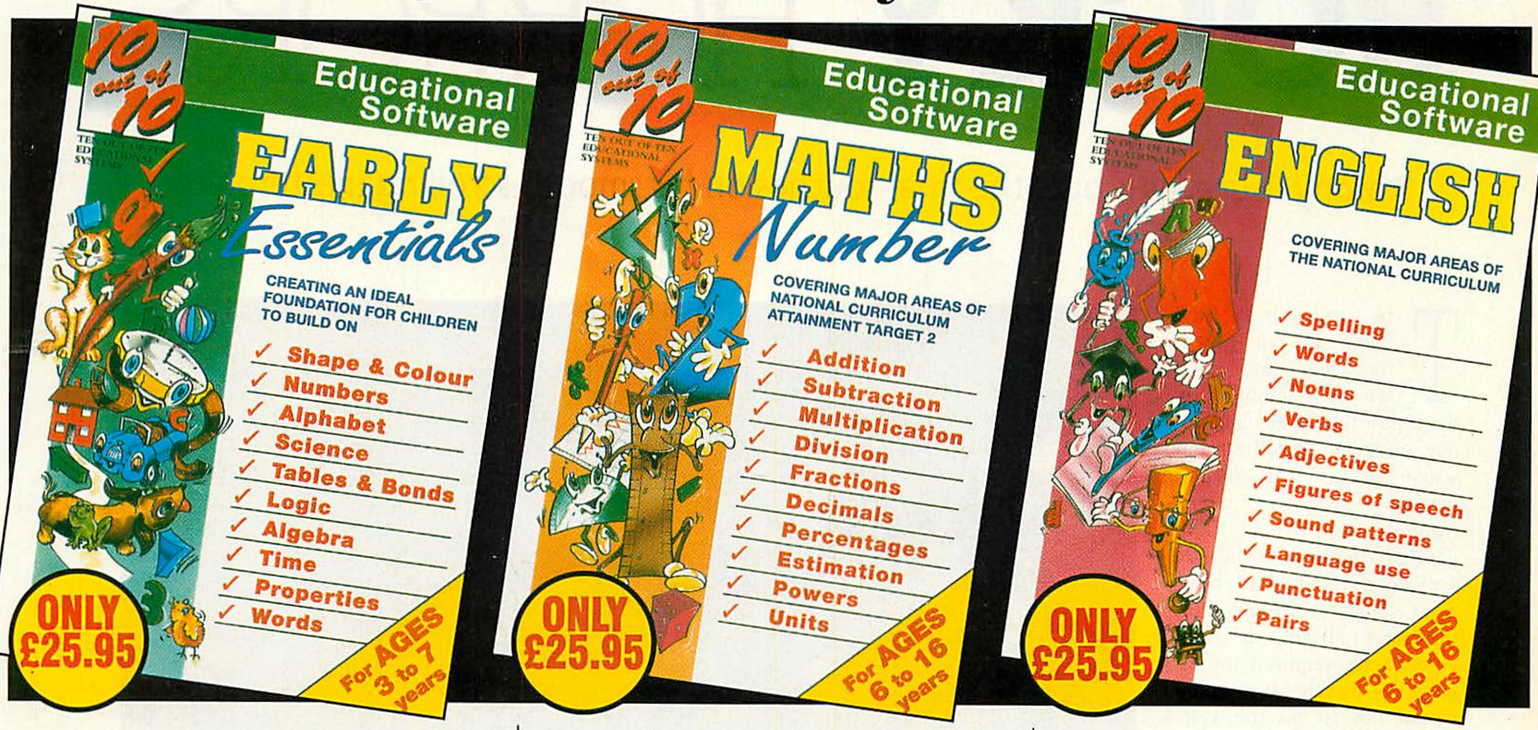
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Early Essentials

For Children Under 7 Years

Subject Areas Covered

Gnasher

Gr1	Recognise simple shapes and colours	Shape/Col
Gr2	Learn the order of the numbers 1 to 10	Numbers
Gr3	Learn the alphabet – with pictorial clues	Alphabet
Gr4	Simple sequences including odd and even numbers	Logic
Gr5	Discover properties of common objects	Science
Gr6	Experiment with numbers and operations	Table/Bond

Link Up

Gr1	Match and link shapes and colours	Shape/Col
Gr2	Learn to count up to ten	Numbers
Gr3	Recognise the link between upper and lower case	Alphabet
Gr4	Link two shapes to composite pattern	Logic
Gr5	Match analogue to digital clocks	Time
Gr6	Know a selection of simple words	Words

Artist

Gr1	Colour and coordination skills	Shape/Col
Gr2	Counting with colours	Numbers
Gr3	Number stories with coloured rods	Table/Bond
Gr4	Following rules to recognise attributes	Properties
Gr5	Pattern and symmetry through shape and colour	Algebra
Gr6	Beginning a basic science vocabulary	Science

Grab It

Gr1	Check shape and colour knowledge	Shape/Col
Gr2	Reading simple alpha-numeric look-up tables	Alphabet
Gr3	Improving reading/vocabulary	Words
Gr4	Recognising characteristics (size + shape + colour)	Properties
Gr5	Reading and understanding two-way tables	Logic
Gr6	Identifying scientific ideograms	Science

Stones

Gr1	Understanding number conservation	Numbers
Gr2	Stepping through the alphabet	Alphabet
Gr3	Patterns of growing and shrinking shapes	Properties
Gr4	Learning to tell the time	Time
Gr5	Practising number skills	Table/Bond
Gr6	Using common sense to follow a sequence	Logic

Racer

Gr1	Understand the meaning of push and pull	Science
Gr2	Following letters in alphabetical order	Alphabet
Gr3	Associating words and pictures	Words
Gr4	Elementary algebra – "find a number" problems	Algebra
Gr5	Knowledge of everyday items	Properties
Gr6	Accurate and rapid time recognition	Time

Maths (Number)

For Children 6 to 16 Years

Levels of Attainment Target 2 Covered

Carnival

Gr1	2a.1	Know and use addition facts up to 10	Addition
Gr2	3c.2	Understand remainders in a calculation	Division
Gr3	4a.2	Multiplication facts up to 10 x 10	Mult.
Gr4	5b.2	Calculate percentages of quantities	Percents.
Gr5	6a.5	Relate equivalent fractions to decimals	Decimals
Gr6	8c.1	Use of estimation to check size of answers	Estimate.

Cover Up

Gr1	3a.4	Know and use subtraction facts up to 20	Subtract.
Gr2	3b.1	Multiplication. facts up to 5 x 5	Mult.
Gr3	4a.4	Mental addition of 2 two-digit numbers	Addition
Gr4	4a.10	Division of two-digit nos. by single digits	Division
Gr5	6a.4	Using equivalence of fractions (and ratios)	Fractions
Gr6	6a.10	Convert fractions to percentages	Percents.

The Big Bang

Gr1	2a.2	Know and use subtraction facts up to 10	Subtract.
Gr2	3a.3	Know and use addition facts up to 20	Addition
Gr3	5a.3	Multiplication of single-digit powers of 10	Mult.
Gr4	5a.4	Mental division of single-digit powers of 10	Division
Gr5	6a.8	Percentage changes	Percents.
Gr6	6a.9	Convert fractions to decimals	Decimals

Grab It!

Gr1	3e.1	Use decimal notation with money	Units
Gr2	3b.2	Know and use the 2, 5 and 10 times tables	Mult.
Gr3	4a.5	Mental subtraction of 2 two-digit numbers	Subtract.
Gr4	4a.6	Mental addition of several single-digit numbers	Addition
Gr5	6b.1	Estimate multiplication and division	Estimate.
Gr6	7a.2	Division of multiples of powers of 10	Division

Silicon Brain

Gr1	2b.2	Find the difference between numbers	Subtract.
Gr2	3e.3	Use a wider range of metric units	Units
Gr4	5b.1	Calculate fractions of quantities	Fractions
Gr3	4d.4	Multiplication and division problems	Division
Gr5	7b.3	Use memory and brackets on calculator	Mult.
Gr 6	8a.1	Standard form (integral powers of 10)	Powers

Cheers

Gr1	2b.1	Whole number add and subtract problems	Addition
Gr2	3d.2	Make estimates based on familiar units	Estimate.
Gr3	4a.14	Solve multiplication and division problems	Mult.
Gr4	5d.1	Imperial units in daily use	Units
Gr5	5d.4	Use index notation	Powers
Gr6	8b.2	Four rules of fractions	Fractions

English

For Children 6 to 16 Years

Attainment Targets and Levels Covered

Sniper

Gr1:	4.2b.1	Simple monosyllabic words	Spelling
Gr2:	2.2a.1	Read & understand Signs, Labels Notices	Words
Gr3:	3.3a .1	Capital letters full stops and question marks	Punct.
Gr4:	2.7d.1	Retrieve information (Abbreviations etc.)	Lang. use
Gr5:	2.7e.5	Literary devices (Proverbs)	Speech.
Gr6:	3.8c.1	Grammatical constructions (Passive Tense)	Verbs

Cover Up

Gr1:	2.1b.1	Recognise simple words (adjectives)	Adjectives
Gr2:	2.2e.2	Respond to poems (rhyming words)	Sounds.
Gr3:	3.3e.6	Masculine to feminine nouns	Nouns
Gr4:	4.3c.1	Awareness of word relationships (opposites)	Pairs
Gr5:	4/5.5a	Spell words of greater complexity	Spelling
Gr6:	2.8e.1	Lang. change over time	Lang. Use

Word Fit

Gr1:	4.2c.1	Spelling patterns (blends)	Words
Gr2:	4.3c.2	Awareness of word relationships (synonyms)	Pairs
Gr3:	3.3a..1	Sentence structure	Verbs
Gr4:	2.5e.3	Awareness of choice of words	Sounds.
Gr5:	2.5e.3	Unconventional spellings	Nouns
Gr6:	4/5.6b	Common misspellings	Spelling

Grab it

Gr1:	2.2f.1	Read a range of simple material	Speech.
Gr2:	2.2c.2	Phonic cues in reading	Spelling
Gr3:	3.4d.3	Structures of English (Collective nouns)	Nouns
Gr4:	3.6b.2	Use of the the Apostrophe	Punct.
Gr5:	2.7c.3	Choose vocabulary	Lang. use
Gr6:	3.7c.4	Lexical features	Words

Librarian

Gr1:	2.2c.1	Use initial letters to recognise words	Spelling
Gr2:	4.2c.2	Spell a wider range of words (plurals)	Nouns
Gr3:	2.3d.3	Appreciate links between words and sounds	Sounds.
Gr4:	3.4e.2	Revise & redraft writing (descriptive words)	Adjectives
Gr5:	2.7e.2	Use of literary devices – Similes	Speech.
Gr6:	3.7c.4	Choose a wider vocabulary	Pairs

Cheers

Gr1:	3.3e.6	Check for consistent use of comparatives	Adjectives
Gr2:	3.3e.8	Simple use of past tense	Verbs
Gr3:	2.5e.1	Word play	Words
Gr4:	3.5e.1	Use and misuse of colloquialisms	Lang. use
Gr5:	3.7b.2	More complex punctuation	Punct.
Gr6:	3.8c.9	Poetical constructions	Sounds.

Before you buy ANY educational software ASK these questions:

- Is it designed and developed in **BRITAIN** and directly linked to the **NATIONAL CURRICULUM?**
- Has it been designed to use the **POWER** of your 16 or 32-bit computer and not just converted from an existing 8-bit product?
- Does it **MOTIVATE** and **REWARD** the children?
- Is children's progress constantly **MONITORED** and **RECORDED**?
- Can it be **CUSTOMISED** to meet your child's needs?
- Do parents and teachers agree on its **QUALITY**?
- Will it **EDUCATE** your child now but also have sufficient **FLEXIBILITY** to last for several years without the need to purchase the next level?
- Are the producers **CONFIDENT** enough in its quality to let you test it yourself **FREE** – at home or in school?
- Does it **CHALLENGE** more able students but also have levels for beginners?
- Are there **CLEAR** and **OBVIOUS** educational objectives?

If any answer is no, it's not 10 out of 10!

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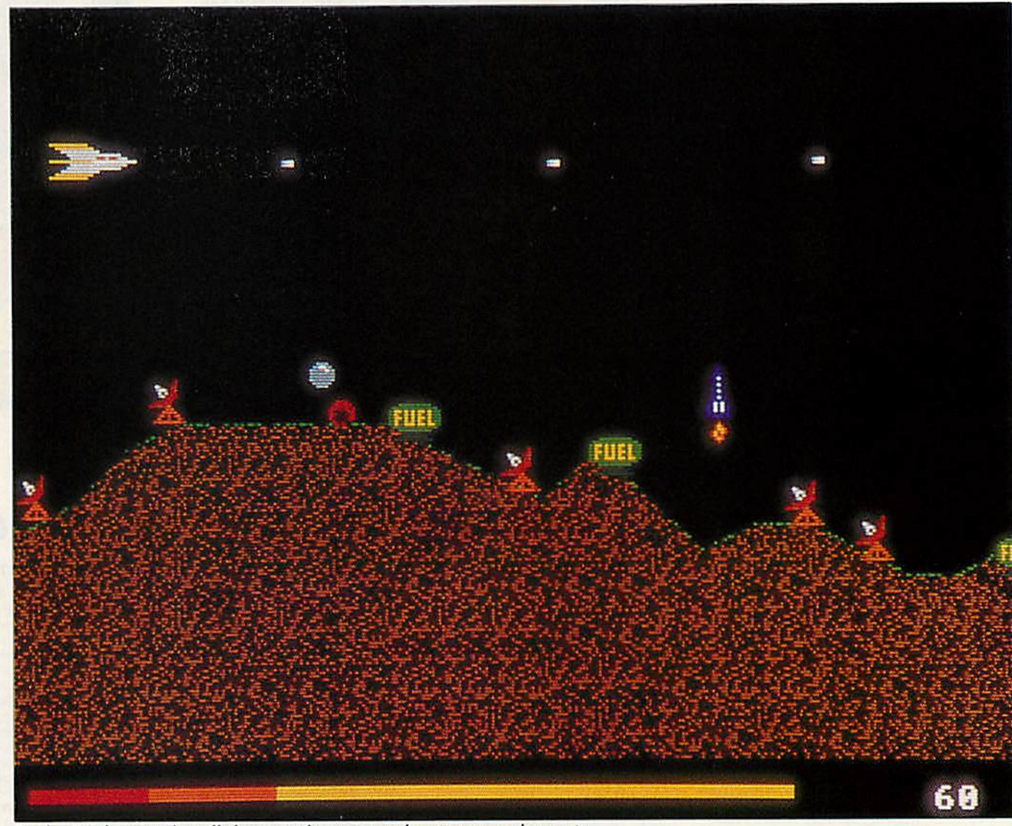
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ROCKY HORRORS

Antony Bruce Lytis puts the final touches on his smooth-scrolling masterpiece

The time has finally come to put together the bits and pieces we've assembled over these past few issues and write our complete scrolling landscape game. The resulting epic, *Rocky Trade*, (resemblance to any other game, living or dead is purely accidental) could still benefit from some refinement, but it illustrates all of the major components required for most games of its type. It is so big it would not fit on the yellow pages, so the full system will be on the subscriber's disc.

As well as landscape scrolling and sprite plotting, *Rocky Trade* features 'collision detection' – finding out which bullet has hit which unfortunate space being – and an 'alien management system'.



Rocky Trade contains all the most important shoot-em-up elements

GAMEPLAY

The object of the game is quite simple. Using the keys shown at the start, navigate your rocket through the various sections of the landscape and destroy the (slightly) camouflaged secret nuclear base at the end. Energy is shown at the bottom; when it reaches zero your craft will 'do a SkyLab'. To refuel simply bomb/shoot the fuel dumps; illogical, but traditional. You have just three lives and must restart each mission from the beginning. There are no cheat modes but you have the source code, so invent your own.

ALIEN MOVEMENT

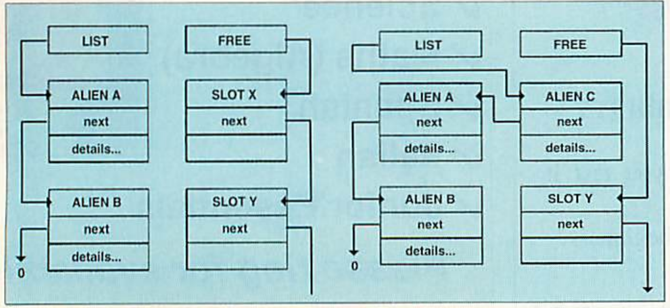
A feature common to most games is how to keep track of all the 'aliens' or whatever nasties feature in them. In *Rocky* there are several hundred aliens waiting to appear on the screen as you fly along and it would clearly be impractical to worry about all of them all of the time. The game scrolls at 50 frames a second and we are replotting the whole screen each frame. We therefore have to be very careful with our limited time allowance. When you add bullets and bombs to the picture, we have to be more careful still. The answer is a linked list, or rather two.

The linked list is an age-old data structure that is particularly handy in situations like this. It consists of a pointer to the first element in the list. This too contains a pointer to the next element as well as its own data. The next element contains a pointer to the third and so on.

The last element has a next pointer of zero indicating that the list is at an end. The advantage of a linked list is that an element may be added to the list – or removed – very easily. Only the pointers need to be changed so there's no great shuffling of memory; crucial when time is of the essence.

In *Rocky*, two linked lists are maintained. One contains all the details of the currently active aliens. When an alien is created its details are added the to linked list as a new element. To make this possible a second linked list of free slots is kept. Whenever a new alien is created, a slot is borrowed from the free list and added to the active list. When an alien dies or disappears, the slot is returned to the free list so it can be used again.

In the diagram, Aliens A and B are already active and the free list contains slots X and Y amongst others. When alien C is created, the first slot in the free list is 'de-linked' and the details for the new alien are entered into it. Then



A linked list before and after the creation of an alien



Scrolling backgrounds can vary a lot throughout the game

it is linked into the start of the active alien list. The aliens located along *Rocky*'s landscape are stored in sequence with a pointer to the next one that may appear.

COLLISIONS

One of the trickiest features of a game like *Rocky* is detecting when two sprites have collided. In fact, there are two distinct sorts of collision. Some sprites may collide with the background and a check needs to be made at the start of each frame to see whether this has occurred.

Secondly, some sprites may collide with others and a separate check needs to be made for this. To reduce the scale of these checks, sprites are 'classed' depending on their nature. In *Rocky* there are three classes: one contains the ship, bullets and bombs, another the nasties like rockets, fuel dumps and dishes. A final class is allocated to the meteors which are special; they are nasty but cannot be destroyed by being shot at.

For each frame, the background is plotted with a call to copy_bank. At this point the next frame is ready to have the sprites added to it. Next do_aliens is called; this processes the aliens, moving them, checking for new arrivals or departures and so on. Now back_collide is called.

This goes through the list of active aliens, checking the class of each to see if it could potentially collide with the scenery. If so, the routine collide_check is called. This is very similar to the sprite plotting routine show_sprite except that the screen isn't actually altered. Instead, the contents of the screen are ANDed with the sprite's mask. If the result is ever non-zero, the alien must have crashed.

Collisions between two different types of aliens are a little more complicated. First, the list is examined to find aliens of type one (ship, bullet, bomb). For each one found, the list is searched again for aliens of the other types. If found a sprite is compared with the first sprite. Initially this is done by finding the 'bounding boxes' of the two sprites – the smallest rectangles which you can be sure wholly contain the sprites. If these do not overlap the comparison need go no further.

If the boxes do overlap, further checks must be made. How accurate this check needs to be depends upon the type of game and nature of the sprites involved. In some games bombs may be set off when an alien gets near enough and this is far easier to check for than the overlap of a single pixel.

In *Rocky* however, we do things properly to show how that can be done. The two sprites are plotted on a 'mini' screen (called small_screen). They are plotted in the same relative positions they have on the main screen and the plotting is done in a special way. First the mini screen is cleared to zeros. Then each sprite's mask is ANDed with &11111111. That is, a 1 is produced for each solid pixel in the sprite. The values are literally added to the small screen. Whenever two pixels overlap, the two ones of the colliding aliens will have been added to form a two. The diagram on the right shows this happening, as a bullet hits the side of a fuel dump. Because two is a different value from one, a quick check of the small screen using multiple load instructions can be made to speedily discover any overlapping pixels.

0	0	0	0	0	0	1	1	1
0	0	0	0	0	1	1	1	1
0	0	1	1	1	2	1	1	1
0	0	1	1	1	2	1	1	1
0	0	0	0	0	1	1	1	1
0	0	0	0	0	0	1	1	1

How a bullet collides with an alien

Sprite plotting was described in a previous article and the routine show_sprite is based on one of those earlier examples. For each sprite loaded, four versions are created – one for each byte alignment within a word – and their addresses are stored in the table move_sprite%.

Animation is not supported in this version, but an extension to this table could easily cater for it. By using four images, all plotting can be done in words which is much faster than bytes. Further speed increases could be achieved using LDM and STM as described previously, but LDR and STR are fast enough.

Dead aliens are plotted using a special routine adapted from show_sprite. The hybrid show_sprite_dying takes an extra parameter in R3 which specifies how 'dead' the alien is. This is used to look up a special 'fade' sprite in which the dying sprite's shape is 'covered'. The fade sprites can be found in *Sprites.Aliens*.

Sound isn't featured in this version of the game, so you'll have to wait for next month's disc for the whooshes and pings you crave.

If you really *do* want to type this listing in, send us an SAE marked Rocky, and we will send the complete listing.

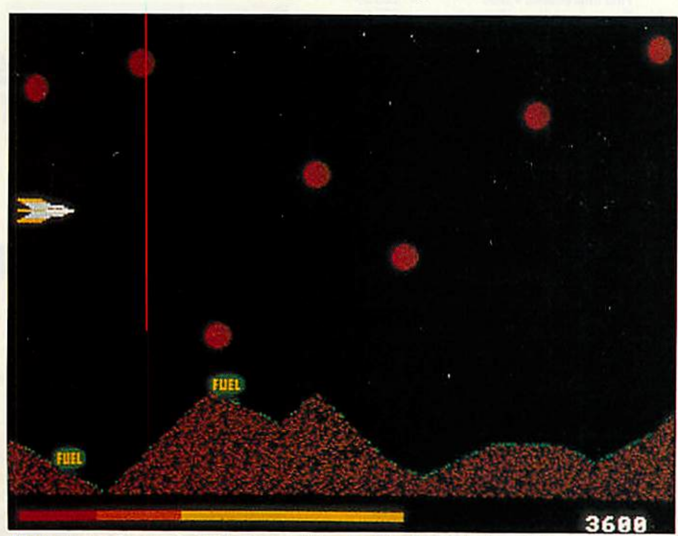
The component files are located in these subdirectories:

- $.Rocky.Games.Rocky
- $.Rocky.Layout.level1
- $,Rocky.Maps.Rocky
- $.Rocky.Movement.Aliens
- $.Rocky.Patterns.Aliens
- $.Rocky.Rocky
- $.Rocky.Scenery.Land16/9
- $.Rocky.rockypal
- $.Rocky.Spritessprite

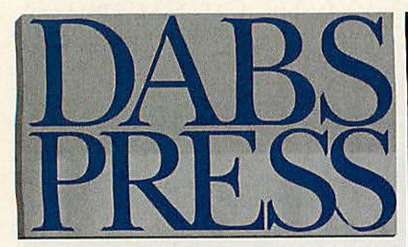
For simplicity, a directory *$.Rocky.* is assumed. All the files are of the formats described in the earlier articles; refer back for details.

Rocky is the game itself and can only be run when the other files have been created. *RandScape2* is an updated version of *RandScape,* which created a random landscape for the game. For a new landscape re-run the program.

Additional code was added to populate the landscape with suitable aliens and provide the various stages. *MakeLand2* is another updated program. This creates background sprites, including some blocks for the 'city' and 'maze' sections. Finally, *RockyDat* creates the alien sprites and a data file called *RockyPal,* which defines the colours used.



Meteors can be made to behave viciously; they're indestructible

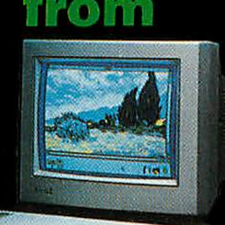


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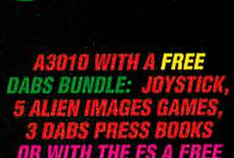






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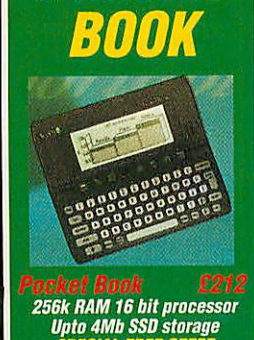
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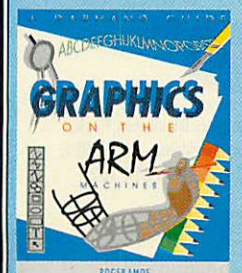
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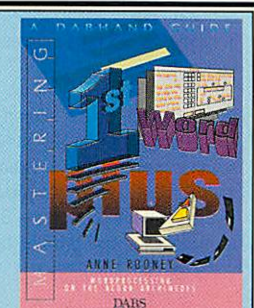
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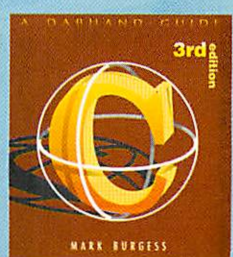
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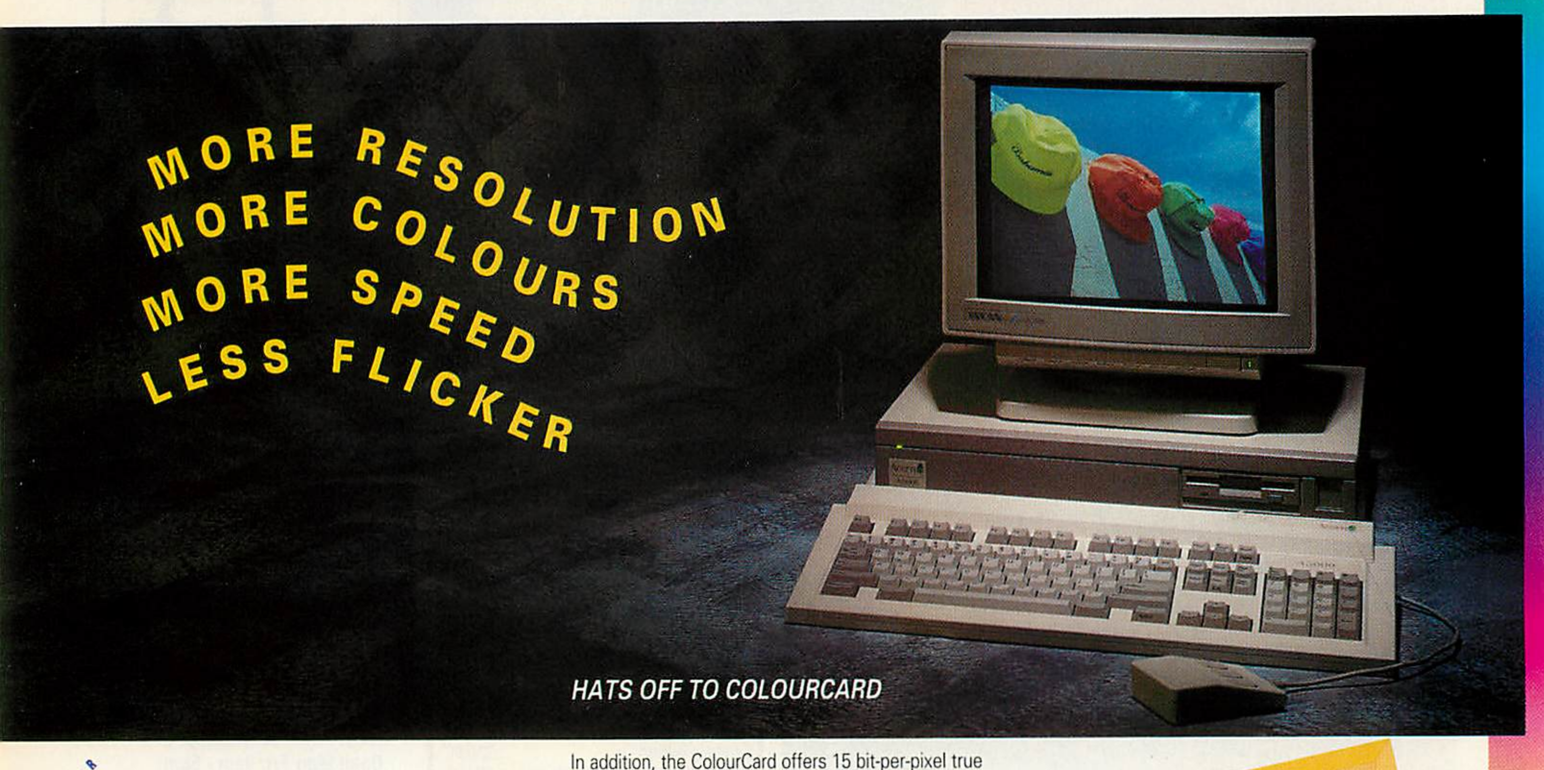
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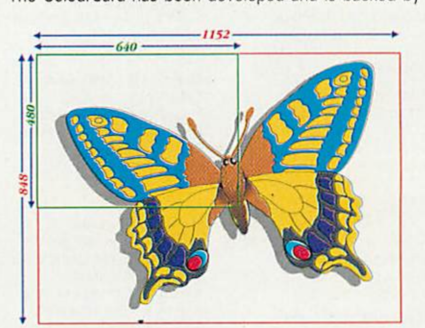
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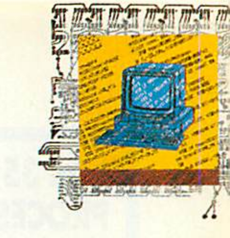
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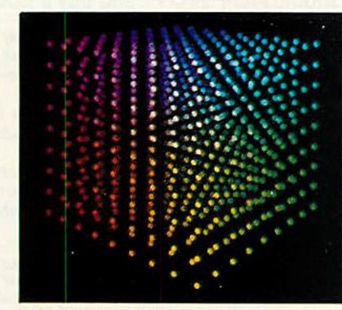
The two Daves present their colour-curdling mixture of cabbages, snake dancing and more

STAR PROGRAM

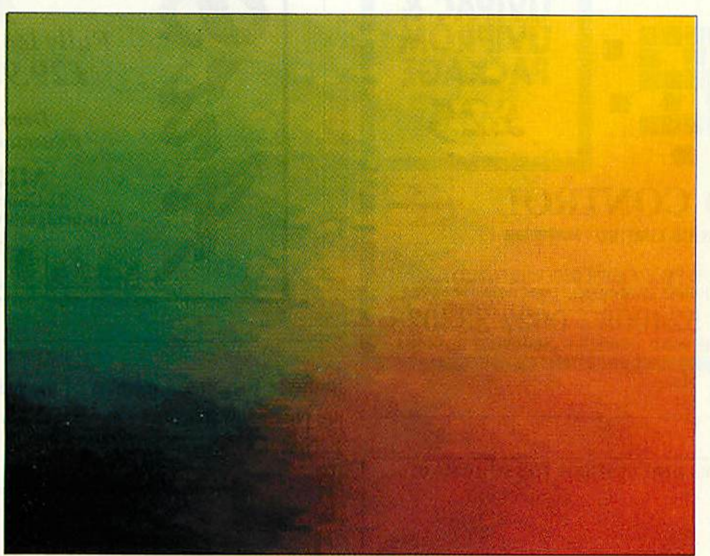
COLOUR SUPPLEMENT

Programs: Graduate, Select, RGBcube, HSVcone, CIE, Interpol
Description: Colour demos
Authors: Michiel van Schaik, DA
Machine: 32-bit
Listings: 20-120 line Basic, M/C

The good old *ColourTrans* module has undergone a bit of an overhaul in Risc OS 3.1 so we thought it was about time to do a little feature on colours; what they are exactly (there's more to it than mere R, G and B) and how to use them effectively in your own programs. This coincides with a submission from **Michiel van Schaik** of Delft in the Netherlands which demonstrates some of the new *ColourTrans* SWI calls.


The standard RGB cube

Defining colour is actually a very hard business indeed. The human eye was not designed to fit in with the metric system but evolved naturally. As a result, colour models are inevitably rather strange at first appearance, since they must take account not only of the physics involved but of the physiology too.


Graduate shows the advantages of dithering

Computers generally use the RGB (Red, Green, Blue) system of colour selection. That is, all colours are considered as being made up of red, green and blue – the three primary colours – added together in the appropriate proportions. When all three of the components are at their maximum intensities, the mixture is of course white.

The shot to the left shows the standard RGB cube, which you can plot on your machine using the program *RGBcube*. Each axis has one of the RGB components. Three of the cube's corners are thus pure red, green and blue. Three others are the secondary colours cyan, magenta and yellow, and the other two black and white.

The *ColourTrans* module was designed to take away the bother of writing colour software that could work in different screen modes. The idea is that rather than selecting a colour yourself with GCOL or the like, you ask *ColourTrans* to do it for you by providing it with the 'perfect' colour you desire in terms of red, green and blue. The simplest *ColourTrans* call is perhaps . . .

```
SYS "ColourTrans_SetGCOL"
,&BBGGRR00
```

. . . which takes red, green and blue values, each in the range 0-255 – combined into a single word for simplicity – and chooses the nearest available colour it can find. This has the added advantage that when graphics hardware improves, software selecting colours via *ColourTrans* will automatically take advantage of the improvement without any modification.

Other *ColourTrans* calls exist to choose colours and to build colour translation tables for sprite plotting. These have all been featured in *INFO in the past.

One of the most useful extensions in the new *ColourTrans* is the ability to select 'dithered' colours, that is, ask *ColourTrans* to mix colours to get a better approximation if it can. This is done by setting bit 8 in R3.

Michiel van Schaik's program, *Graduate*, shows the advantages achieved using dithered colours. Two 'maps' showing red content against green are plotted, one of which is dithered and one not. Note how much smoother the changes are.

The program *Interpol* is another example. Select the colours on the left and right by dragging their R, G and B bars. The program then interpolates between them. Change the number of steps with + or -



Interpol: how to get from R to B

and switch the dithering on and off with D. You may notice that the improvement is particularly good with flesh colours.

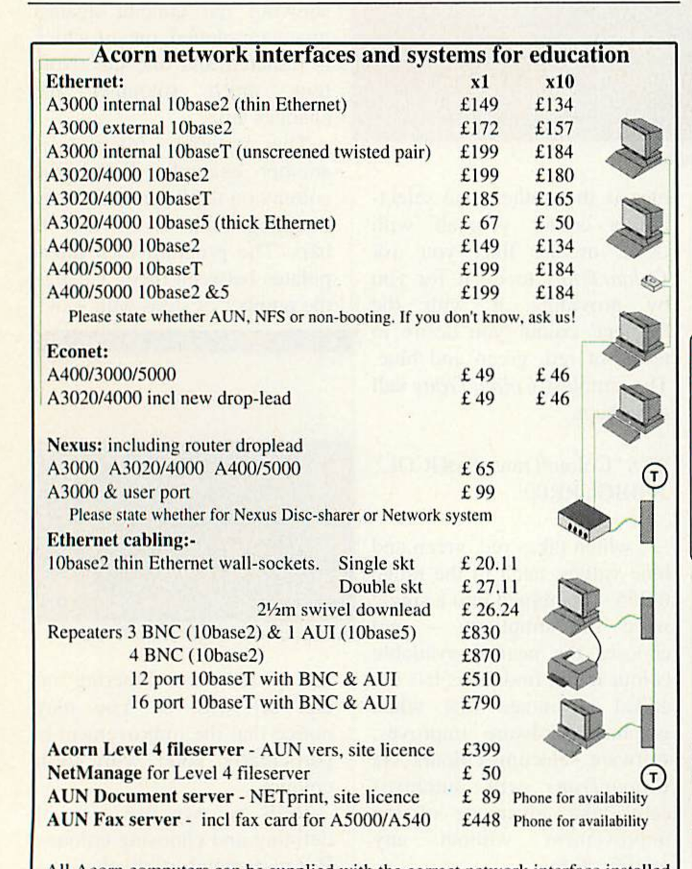
RGB is only one way of defining and choosing colours. Because monitors display pictures by means of red, green and blue dots, it is the natural system for computers. Not

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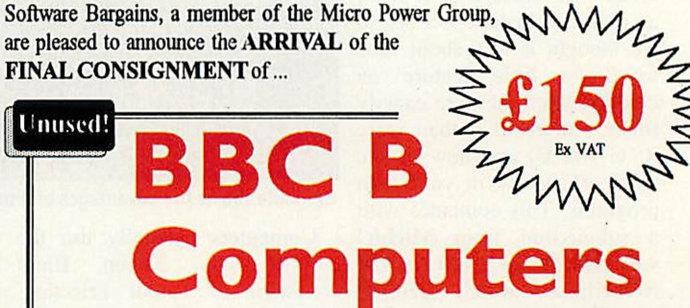
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only this, the three types of 'cone' in the retina also correspond to these three primary colours.

There are many other colour systems around, however, and *ColourTrans* now provides calls to convert between RGB and the most common of the other systems.

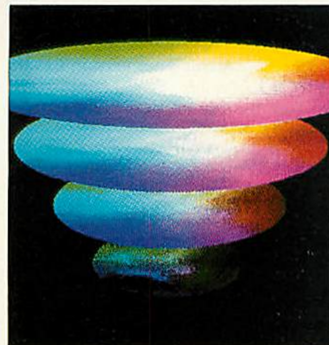
CIE

You may recall a program a good while back in *INFO that showed the so-called CIE chromacity diagram.

In order to define all light sensations we might perceive with our eyes, the Commission Internationale L'Eclairage produced a new standard way back in 1931.

The resulting diagram, an odd horseshoe-shaped affair, showed all the 'chromaticities' that the human eye could perceive. Colours may be thought of as a chromaticity – which is, loosely speaking, what makes a red red or a green green – and a luminance which is how 'bright' that colour appears.

Colours with the same chromaticity but different luminances are mapped onto the same point in the CIE diagram. Each colour is defined in terms of three 'primaries'; X, Y and Z. These are themselves, oddly enough, all outside the visible range.



Cross-sections of the HSVcone

One clever thing about the CIE diagram is that if you take any two points within it, all the colours that lie along the line drawn through those points can be made from combinations of those two colours. This can be extended by picking three points. The triangle formed as a result contains colours which can be made by combining the three corner colours in appropriate proportions.

The range of colours your RGB monitor produces can be defined as such a triangle within the CIE diagram. It is interesting to note that there are some colours that simply cannot be defined using RGB and are therefore not displayable. Printing processes and film are also limited in the number of colours they can produce and are shown as a subset of the complete CIE diagram.

The program *CIE* plots that part of the diagram the RGB system can represent. It uses the call . . .

```
SYS "ColourTrans_Convert CIEToRGB",X,Y,Z TO r,g,b
```

. . . which takes three CIE primary co-ordinates X, Y and Z and attempts to convert them into red, green and blue values. Not all may be converted, and only valid RGB values are displayed.

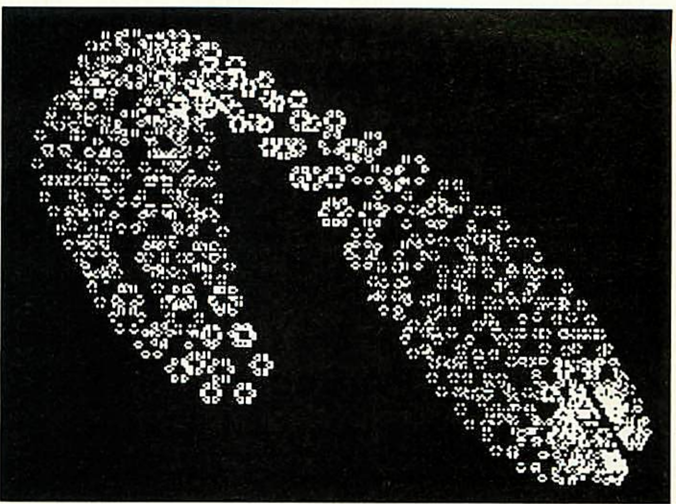
The result is a slightly tilted triangle of colour. The program is in machine code because there are an awful lot of X,Y and Z combinations to go through and it isn't very intelligent. It still takes quite a long time to plot the chart, so be patient.

HSV

This is quite an intuitive system. Unlike the RGB cube, colours are represented as a hexagonal pyramid or cone. The program *HSVcone* plots some cross-sections of this cone so you can see the idea. Dithering is used for good effect, and each of the sections is circular rather than hexagonal, which makes it much easier to code.

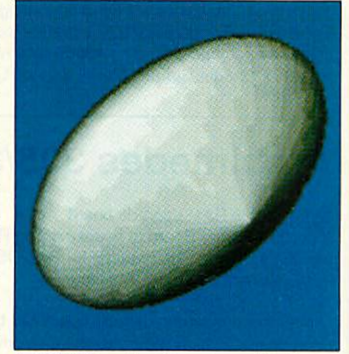
It should be clear how to use the relevant *ColourTrans* calls by looking at the listing. *HSVcone* currently runs in Mode 15 but you can change to Mode 21 for a better result on multisync monitors.

In the HSV system, the V stands for value and runs from 0 at the point of the cone to 1 at the base and is measure of the intensity of the colour. S is saturation and is the distance from a colour to the central axis of the cone. A saturation of 1 corresponds to a pure colour and areas of this saturation are found on the outside of the cone.



Recursive hexagons meet Lissajous patterns in Snake

Moving towards the central axis, S decreases and colours change much as you would expect by mixing a coloured paint with more and more white. Hence, the central axis of the cone runs from black to white. H is the hue and is defined as an angle around the cone. Looking down at the point of the hexcone, it appears exactly as the RGB cube when looking at the black vertex.



A 2,400-faced polygon tops it all

CMYK

This is yet another colour system designed for the printing industry. Colours are defined as being made up of different amounts of the secondary colours cyan, magenta and yellow. The system is subtractive rather than additive. That is, colours start off at white and quantities are subtracted until the desired effect is achieved (in printing you start off with white paper of course).

Each secondary colour can be thought of as being NOT a primary colour, so cyan is NOT red and (R=1,G=0,B=0) therefore corresponds to (C=1,M=0,Y=0). That is, increasing C decreases R equivalently. In fact, only two of the C, M and Y values need to be used at one time. The fourth parameter, K, is subtracted from each component of the final colour.

For example, (C=0, M=0, Y=0, K=0) is white, (C=0, M=0, Y=0, K=1) is black, (C=1, M=1, Y=0, K=0) is pure blue, (C=0.5, M=0.5, Y=0.5, K=0.5) is half-blue. The cyan and magenta components here subtract red and green respectively from the white, leaving just the blue.

So that you can play about with the different systems, try the program *Select* from Michiel. Here a colour is shown together with its RGB, HSV and CMYK components. Drag whichever you like and watch what happens to the others. Note that if you try to increase C, M and Y the program will react by increasing K. The value of K also imposes a limit on the C, M and Y components.

SNAKE DANCE

Programs: Snake, Top
Description: Graphic demos
Author: Jan Vlietinck
Machine: 32-bit
Listings: 160, 520 lines M/C

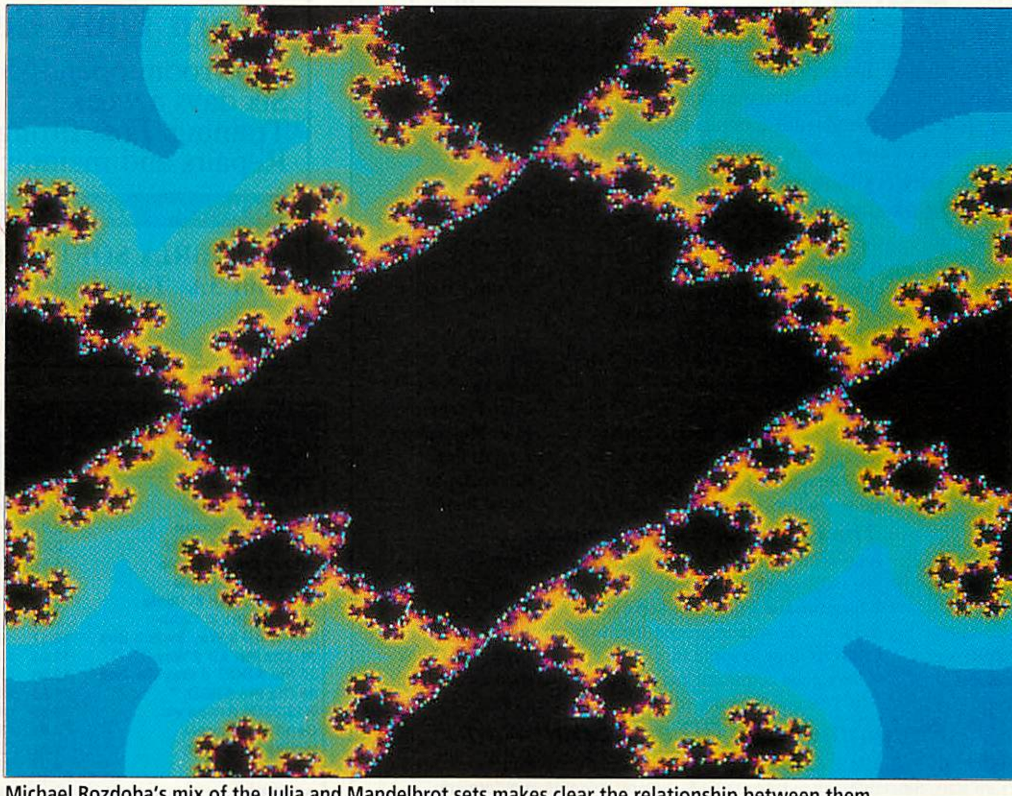
Here are two more zippy machine-code demos from regular Jan. *Snake* is a very pretty piece of recursion. The snake consists of hexagonal stars, plotted recursively. These are zoomed sinusoidally and the whole pattern moves along a Lissajous path. Move the mouse to move the snake and press a button for a new Lissajous figure.

Each frame consists of 32 stars and each of these is constructed with about 200 points. On Jan's A4000 these can be plotted comfortably plotted within a frame.

Top is a 3D demo, displaying a solid top that consists of no less than 2,400 faces. These are shaded accordingly using a fixed light source. Move the mouse around to change the point of view.

The shading of a polygon is achieved by calculating the z component of its normal, multiplying this by a precalculated normalisation factor – the inverse of the surface of the polygon – and using it as an index value to look up an entry in a colour table.

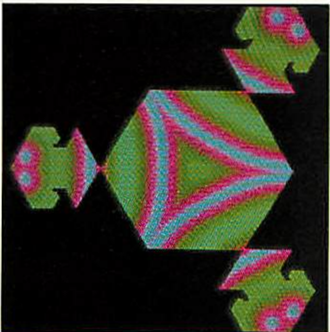
Because hidden facets aren't shown, only about 1,200 need to be shown at any one time. Arm3 users might like to increase the number of polygons by changing the values of m1 and m2.



Michael Rozdoba's mix of the Julia and Mandelbrot sets makes clear the relationship between them

VIBE-RANCY

Program: Cabbage, Pulsar
Author: Jan Vibe
Description: Graphic demos
Machine: 32-bit
Listing: 50 & 130 lines Basic



From pulsars . . .

Scarcely an issue can go by at the moment without a little ditty or two from our resident graphics-mad Dutchman Jan Vibe. This month is no exception, and Jan has provided two excellent demos for your delectation.

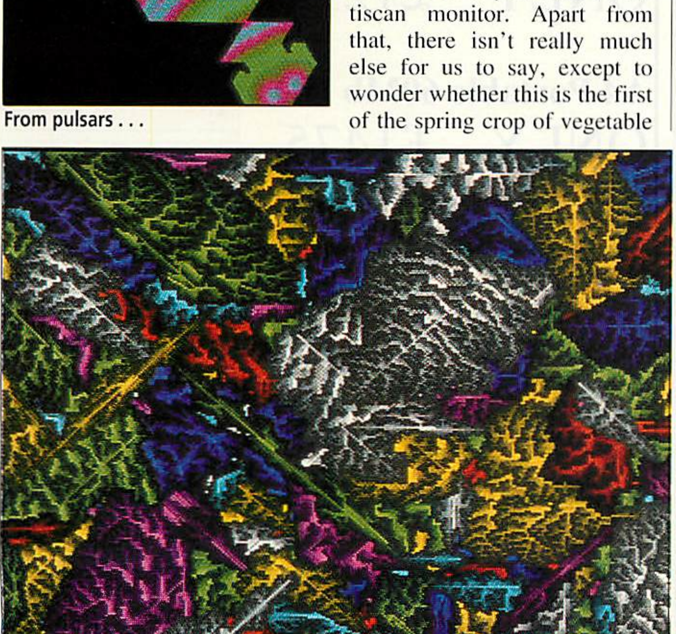
The first was originally entitled *Texture*, but we felt that *Cabbage* was a much more descriptive name. The program will work in either Mode 13, or Mode 21 if you have a multiscan monitor. Apart from that, there isn't really much else for us to say, except to wonder whether this is the first of the spring crop of vegetable simulators. When will we see the first fractal turnip?

Jan's second program, *Pulsar*, 'Displays a pulsating, ever-changing, pattern symmetric about two, three, four or five axes'. The program uses 16 colours and it will run quite happily in Modes 12, 20 or 31. You are prompted to select a polygon to draw which then controls the number of axes of symmetry in the finished pattern. Jan recommends you try the hexagon first. In Jan's words:

'The figure is made by defining an angle and constructing a triangle with two points resting on the X-axis of the co-ordinate system and the third point defined by the angle.

'This triangle is sub-divided by a recursive procedure until the triangle is made into a sufficient number of smaller triangles. These triangular 'pixels' are then coloured according to a mathematical formula. The triangle is mirrored in the X-axis and turned roung the co-ordinate system until a solid polygon is constructed.'

The figure is constantly animated by cycling the colours using Jan's cunning rotating method that we have covered before in ✱INFO.



. . . to cabbages as Jan Vibe roams the cosmos in search of who knows what?

UP THE QUASI

Program: QuasiJ+M
Author: Michael Rozdoba
Description: Fractal pictures
Machine: 32-bit
Listing: 135 lines Basic/185 lines machine code

Mandelbrot and Julia set generators are among the most common submissions to ✱INFO. We've covered them so many times that we rarely give a disc labelled 'Julia' or 'Mandelbrot' a second look. Our policy on repeating features is quite simple; if a submission is in some sufficient way faster, shorter or different from the last one we carried, we will include it in ✱INFO.

Michael Rozdoba's quasi-Mandelbrots and Julias fit into the last category. The mathematics that lies behind the program is a little complex, so we'll leave it up to Michael to explain what is involved:

'*QuasiJ+M* generates images that resemble those of the Julia & Mandelbrot sets for the iteration of the map . . .

$$z \rightarrow \{Re(z^2) + i.Im(z^2)\} - c$$

. . . where c is a complex parameter & z is a complex variable. The letter i denotes

SQR(-1), the basis of complex number theory, Re(z) means the real part of z & Im(z) means the imaginary part of z. Compare this method with the familiar Julia sets & the Mandelbrot set, which result from the iteration of . . .

$z \rightarrow \{+ i.Im(z^2)\} - c,$
[that is, $z \rightarrow z^2 - c$]

'When in Mandelbrot mode, *QuasiJ+M* can be used to explore the Mandelbrot set for this function and to select the parameters that will produce interesting images that you can then feed into the Julia generator.

'Support for a reasonable degree of zooming is permitted, although this is limited by the fixed-precision arithmetic I have used to maintain good speed of image generation.

'Images can be generated in any usable 16-colour screen mode & may be saved into the current directory afterwards. I recommend Mode 9 for browsing & Mode 12 (or 20 if you have a multisync, 31 for Risc OS 3.1) for generating final images.

'To use *QuasiJ+M* double-click on the Basic file and select if you wish to start with Mandelbrot or Julia. In the latter case you will be prompted for a pair of parameters. The appropriate set will then be drawn.

'Pressing S saves the image into the current directory; press N to enter a new screen mode. Space lets you zoom in on the current image using the mouse; Select reduces the size of the target window; Adjust increases it; while Menu starts image generation for the target window selected.

'Alternatively, pressing I lets you type in manually a new set of window co-ordinates. Finally, keys J and M swap between plotting the Julia and Mandelbrot set. When going between the Mandelbrot and Julia sets, the Julia set parameters are taken from the current Mandelbrot view.'

SQUIGGLE REVISITED

Program: Squiggle1
Author: Alan Beasley
Description: Computer-play routines for Squiggle game
Machine: 32-bit
Listing: 240 lines Basic

In the July 1991 issue, we carried a two-player game by Barry Wickett called *Squiggle*. At the time we asked if anyone could come up with a set of routines that would allow the computer to play. Well, it's taken nearly two years, but Alan Beasley has done just that. For those in the dark, the game takes place on a square board and starts in a corner square.

Two players then take it in turn to play one of the three pieces shown, such that it continues the path already laid. You win if you make the path reach the opposite corner from the start and lose if you make it lead off the side.

Barry explains: 'In my first attempt, the computer moved in a randomly selected direction, simply avoiding paths that lead off the board. This proved very easy to beat. A little analysis reveals that the winning strategy – provided no intermediate squares have been visited already – is: If the number of the moves to the right and up is odd then move right or up, otherwise move left or down. This version of the program was not very successful either.

'I then tried combining these two methods and determining the computer's move by picking one of the methods at random. This seems to provide quite a playable game. Although it is almost impossible for the computer to win by reaching the target square – as the player can usually baulk it at the last moment – it is quite difficult for the player also and more often than not the game develops into a cat-and-mouse chase in which the loser finally gets trapped on a square from which all the exits lead off the board.

'It is very easy for the player to make a mistake during the end-game when most of the board is covered by a spaghetti-like line, whereas the computer will never make a wrong move.'

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HINTS AND TIPS

● A quicky from Geoffrey Lane. He reminds us that in *Draw* it is possible to use the cursor keys to move the pointer as well as the mouse. This allows objects to be positioned with much more precision. This function also works when using the 'edit' option, but the mouse Adjust button must be kept pressed.

● From Mike Williams, a useful extra facility for the *DrawItalic* program featured in the December issue. If you want drop shadow letters that really stand out, take some text in an outline font and convert it to a path. This can be achieved with *Draw3*, *Draw+* or *Artworks*. Set the line colour to black and the fill colour to white then save it. Run *DrawItalic*, set the nib thickness to zero. The nib width controls the depth of the 3D effect; experiment for the best results. Now load both files back into draw and position it exactly over the top of the italicised version. Precise positioning can be achieved by using a grid of the same value as your nib width and using 'snap to grid'.

● Finally, from Duncan Breckels, a hint for running *The Train Game* from the desktop. First create an application directory with a suitable name and design and save a *!Sprites* file. Place a copy of the game in the directory and call it *!RunImage*. You might also like to place a copy of *65Tube* there. The *!Run* file you need is then:

```
RMEnsure 65Tube 0 RMLoad <Obey$Dir>.65Tube
Key 0 *Run <Obey$Dir>.!RunImage|M
FX 138,0,128
EmulateTube
```

DANCING & SKATING

Program: Dancer & Skater
Author: Mark Hobson
Description: 'String-thing' graphics
Machine: 32-bit
Listing: 50 & 60 lines Basic

One of the most popular one-liners we have published was *StringThing*, which has reappeared in a number of weird and wonderful incarnations. Mark Hobson's programs both use the same sort of routine as *StringThing* but with stronger negative gravity. This is used to calculate the backbone of the figure.

The arm and leg positions are calculated from different parts of the backbone. The mouse is used to control both the figures. *Skater* is identical to *Dancer* except that he/she has a skateboard, a floor, gravity and a box to jump over.

✱ QUIT

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BEGINNERS' BIT

Variable names ending with a dollar character ($) are used to hold 'string variables'; computer-speak for words. They are called strings because they consist of a string of characters. They can be assigned, INPUTed and PRINTed in much the same way as ordinary numeric variables. It is also possible to add two strings together with the + operator; sadly, no other numerical operators will work. However, there are a handful of functions provided by Basic specifically for handling strings in interesting ways.

Starting from the simplest, we can find the length of a string with LEN. This takes a single string variable as an argument and returns the length of the string as its result; for example, LEN("Acorn") = 5. In practically all cases the brackets are optional. Two other functions exist for converting strings into numbers. The first function, VAL, treats as much of the string as it can as a number and then returns this as its result. Hence VAL"12" is 12, VAL "10 green bottles" is 10 and VAL "Nothing" = 0.

Unfortunately (you might think) VAL "3*2" is 3 rather than 6, but this is where are next function, EVAL, comes in. This can be passed a string that can contain any valid expression (as you might see in an assignment for example). You are free to use numbers, numerical operators, other functions such as SIN and COS, user-defined functions with FN and even variable names. It is therefore perfectly legal to have the line: EVAL"2*COS(theta)+3*SIN(theta)". You can even EVALuate expressions with string variables in them: EVAL"a$+b$". One quite common use for this enables you to have a routine that can easily execute a number of different subroutines without a complex CASE statement:

```
INPUT "Name of function ";f$
dummy=EVAL("FN"+f$)
```

This type of structure can often be seen in *INFO programs. It is also possible to convert numerical variables into strings. For this we use the function STR$. This is exactly the opposite of VAL. STR$(12)="12", thus n=VALSTR$n. Once a number is stored as a string, it can be manipulated by all the other string functions which makes it easy to perform functions such as centring or right justifying; we will see routines for these two in a while. As a simple example, LENSTR$num will return the number of digits in the number.

Moving on, it is often quite useful to generate a string of identical characters, for deleting a line of text on screen for example. To save having a FOR ... NEXT loop such as ...

```
FOR i=1 TO 40
  PRINT "  ";
NEXT i
```

... you can use the single statement: PRINT STRING$(40," ");
As you can probably guess, STRING$ repeats a given string a given number of times. The only limitation is that the resulting string must be less than 256 characters long.

The next group of functions all perfom string chopping to extract 'sub-strings'. Given the string a$="BBC Acorn User", then LEFT$(a$,3)="BBC", RIGHT$(a$,4)="User" and MID$(a$,5,5)="Acorn". In other words, LEFT$ extracts the leftmost 'n' characters from the string, RIGHT$ takes them from the right and MID$ takes them from the middle. In the latter case the two parameters are the start character and length respectively. Thus MID$(a$,11,2)="Us". It is possible the leave off the length parameter, in which case the rest of the string is returned, so MID$(a$,11)="User" (the same as RIGHT$(a$,4)).

You can remove a single character from the middle of a string by modifying this slightly; to delete the nth character from a$ ...

```
LEFT$(a$,n-1)+MID$(a$,n+1).
```

Two common requirements of these functions have been allocated a shorthand notation. To find the rightmost character in a string (normally written RIGHT$(a$,1)) you can miss out the ,1 and just write RIGHT(a$). Likewise to remove the last character from a string (for which you'd have to write LEFT$(a$,LENa$-1)) you can use the much simpler LEFT$(a$).

One of the many enhancements made to Basic in Risc OS allows us to overwrite portions of strings using these same three functions. The expression, LEFT$(a$,3)=b$, will replace the first three letters of a$ with the first three letters of b$. If b$ is less than three letters long, then only those characters up to the length of b$ will be overwritten. Fairly obviously you can use RIGHT$(a$,3)=b$ to overwrite the last three characters in a$ and MID$(a$,2,3) to overwrite the second, third and fourth.

I mentioned centring and right-justifying earlier on in reference to printing STR$ed numeric variables, of course the same routines will work for ordinary strings. Centring first, then ...

```
PRINTTAB((width-LENa$)/2);a$
```

... this is very straightforward; we take the length of the string to print and subtract it from the width of 'field' in which we are centring it. This number is amount of white space either side of the string. This is divided by two and uses a parameter to TAB. To right-justify a string in a field of 'width', we could use ...

```
PRINT RIGHT$(STRING$(width," ")+a$,width)
```

... here STRING$ is used to provide a padding string that would definitely be long enough even if we were printing a null string. The string to print is added to the right of this padding and then the desired number of characters are extracted from the end of the string with RIGHT$. This method has the added bonus of printing over any characters that were previously on the screen with spaces. If you were printing the score in a game, you might want to right justify the number with zeros (e.g. Score: 0001020), In this case you'd simply replace the " " with "0". A similar procedure can be used with LEFT$ to left justify a string within a given field and ensure the rest of the field is blank. In this case you could use ...

```
PRINT LEFT$(a$+STRING$(width," "),width)
```

The final function we are going to take a look at is INSTR. This takes two strings as parameters and searches for the second within the first. If it is a valid sub-string, then INSTR returns its position otherwise it returns 0. Thus INSTR("Computing","put")=4. An extra, numeric, parameter can also be supplied, meaning the search for the sub-string starts at that character. INSTR("shipshape","sh") = 1, but INSTR("shipshape","sh",2)=5. INSTR can have many uses, partly because it can take away the need for writing array searches, for example ...

```
REPEAT
  INPUT "Enter month (e.g. jan) : ";month$
  month=INSTR(" jan feb mar apr may jun jul aug sep oct nov dec ",
  " "+month$+" ")-2
UNTIL month MOD4=0
PRINT "Month number: ";(month DIV 4)+1
```

One quite common use of INSTR, in *INFO at least, appears after a menu ...

```
PRINT "(L)oad (S)ave (P)rint (E)dit (Q)uit : ";
REPEAT
opt=INSTR(" LlSsPpEeQq",GET$)DIV2
UNTIL opt>0
IF opt=1 PROCload
IF opt=2 PROCsave
```

This makes for a very short, neat and idiot-friendly system. Upper and lower case are catered for and you could quite easily change the keys without the need for lots of alterations to the IF statements.


PAUL SCHOFIELD

ASSEMBLY LINE

Dave Lawrence sums up a year of machine code as Assembly Line draws to a close

This is the second to last article in this series, so I am going to finish off with a summary of everything I've talked about to date this month and a question and answer page about machine code next month. After that, you're on your own.

The Arm processor has a 32-bit data bus, allowing it to handle 32-bit numbers (up to 4,294,967,296 in decimal). It has 16 data registers, one of which (R15) is a dedicated program counter (pc) and another (R14) which doubles as the 'link' register on a subroutine call. The other 14 are undedicated and can be used freely. A number of conventions are usually adhered to about some of these, however, the only one you are likely to run into at this stage is the stack pointer (R13).

Arm instructions generally consist of two or three registers and sometimes a shift value. The destination register is always on the left and source registers on the right, so instructions could be thought of as direct translations of their mathematical counterparts (for example: x=a+b -> ADD x,a,b).

Registers can be loaded with immediate constants using MOV for positive numbers or MVN for negative numbers. A wide range of constants can be used because of Acorn's clever use of the 12 bits available for the constant. Eight bits are used to represent the data part of the number and the other four are used as a shift. In general you don't need to worry about this,

If you get a 'bad immediate constant' error, you've tried to load an illegal value and you'll either need to load it from memory or generate it in some way. The instruction MVN behaves the same as MOV except it loads the logical inverse of the number you supply (meaning NOT).

Instructions exist for simple mathematical manipulation: ADD and SUB should be self-explanatory. There is also a Reverse SuBtract (RSB) instruction which subtracts the first register from the second. Versions of these also exist which make use of the carry flag (ADC, SBC and RSC), which allow you to extend the 32-bit limit of calculations.

ROLL OUT THE BARREL

All of these instructions can have an optional shift applied to the second source register by means of the barrel shifter, which is one reason why there is a RSB instruction. This can take any of the forms ASL, ASR, LSL or LSR – which mean Arithmetic or Logical shifts Left or Right – followed by an immediate constant shift value or a reference to a further register.

This shift takes no extra time to execute and it can thus be used to great effect in calculations. A right rotate is also allowed (ROR). There is no explicit left rotate instruction; you have to use ROR 32-(left). An extra rotate, RRX, or Rotate Right with eXtend performs a 33-bit rotate including the carry flag.

Two multiplication instructions are provided, MUL and MLA. MUL takes two operands – but no shift – and simply multiplies them together. MLA takes three, multiplies the first two and adds the third, but again no shift is allowed.

Bitwise logical functions are supported with AND, ORR and EOR, all of which perform as expected. The 'opposite' of ORR, which sets bits, is BIC, which clears specific bits. It is exactly equivalent to OR NOT. Shifted operands can freely be used with these operators.

As it stands, the Arm will execute every machine code instruction as it comes to it. It is possible to change this – without using branching instructions, which we will come to in a while – by using conditional execution. A total of 16 condition codes are supported by the Arm chip. By adding one of these condition codes to

the end of an instruction, it will only be executed if the chip's status flags are in the appropriate state.

These flags can be set in a number of ways, the most common of which are by adding an 'S' to an instruction, or by using one of the four comparisons available.

Adding an S will set the flags according to the result of the instruction, so, for example, if the result is zero, the Z flag will be set, which can then be detected and acted on by using the EQ or NE condition codes. The four comparisons allow a finer degree of control over what is compared. CMP compares a register with a constant or a another register, CMN is similar but is used for negative comparisons.

Unlike MVN, CMN compares the numerical negative of the operand rather than the logical inverse. TEQ is a slightly more refined CMP and only sets the Z flag (it stands for Test EQuivalence). It is useful when you do not wish to affect the other condition flags. TST is a bitwise comparison performing an AND on its operands but not storing the result anywhere (for completeness, note that CMP and CMN perform a SUB but do not store the result).

BRANCHING OUT

When you need to take more drastic steps in changing the order of execution, you will need to use the branch instruction B. As with all instruction you can add any condition code to make this into a conditional branch. Subroutines are also handled by the Branch instruction, so you need to add an L to make this instruction into a Branch with Link.

This is exactly the same as an ordinary branch except the old program counter is copied into R14 (the link register). Control can be returned to the calling routine with the instruction MOV PC,R14. If you wish to preserve the original status flags you can add an S to the MOV. If your subroutine needs to call a further subroutine, you will need to make use of the stack; more on this below.

Data can be transferred between the Arm's registers and the memory using either the LD (load) or ST (store) instructions. They come in two flavours, the vanilla flavour, LDR for handling single words and the super-duper chocolate fudge sundae flavour, LDM for dealing with multiple registers. LDR (and STR) actually have a little extra hidden up their sleeve; they can also transfer single bytes by adding a B. In this form they can load and save bytes from any memory location.

When dealing with whole 32-bit words – meaning, without the B – they only work as you expect on word boundaries (meaning addresses divisible by four). The source of a load (and the destination of a store) must be an 'indirected register'. In other words, a register must be set up to contain the address you wish to access, which is represented by putting the register in square brackets.

Pre- and post-indexing is supported, which allows you to add a constant to this register before or after the access to memory is made. Pre-indexing is represented by including this offset – which can be a constant or a register with an optional shift – within the square brackets separated from the 'address register' by a comma. If you add an '!' after the closing square bracket this constant will be permanently added onto the address register; this is called write-back. With post-indexing the offset is put after the close bracket and write-back is assumed (it wouldn't make sense without it). Both of these forms of indexing come 'for free' and take no extra time.

The chocolate fudge sundae variety of transfer, which amounts to the instructions LDM and STM, take a single register as an address and a list of registers – in curly brackets – to store starting at that address. This can either be represented singularly (R0,R1,R2) or in shorthand (R0-R2). The action to take between the storage of each register needs to be specified, which is achieved by adding a couple of characters to the LDM or STM.

Two instruction notations are supported; one designed for stacking registers and the other for data transfer, there is no actual difference in the instructions assembled, but it does make code easier to write (and read). Tables three and four show the various types and their equivalents in each notation; in essence the suffix dictates which instructions in table four are executed.

GETTING WRITE-BACK TO YOU

Write-back is also supported by adding a '!' to the name of the address register. You will often see subroutines that stack the registers they use at the start – so they are not corrupted on return to the calling routine – along with the link register and restore the same registers and the PC on return, to return to the calling routine. An extra ^ after the list of registers will restore the original values of the processor status flags as well (in much the same way as the line MOVS PC,R14).

One common function needed is not actually provided by the Arm, but is supported by most assemblers. As you must provide an address register when using LD and ST, a means of pointing a register at an address is needed. ADR does just that. It takes a register an an address as parameters and assembles a suitable ADD or SUB instruction with the PC as the other parameter so that the destination register contains the desired address. Obviously the address needs to be at an offset that can be assembled into a 12-bit constant or you will get an 'outside address range' error.

The only other instruction you are likely to meet is SWI, which is the magic one that gives you access to all the wonderful operating system routines. You will have seen a few over this series, but a full list is slightly beyond the scope of this article.

THE END IS NIGH

That's the end of our whistle-stop tour of simple Arm programming. If you have any queries, please refer to the relevant issue for more details. Or, if you are still stuck, please write to me care of *INFO at the usual address and either Dave Acton or I will do our best to help you. As I said at the start, next month will be a question-and-answer page covering the queries I have received about Arm programming over the last few months.

ARM INSTRUCTIONS

Data transfer:
- MOV, MVN

Arithmetic operators:
- ADD, SUB, RSB
- ADC, SBC, RSC
- MUL, MLA

Logical operators:
- AND, ORR, EOR, BIC

Data storage:
- LDRB, STRB
- LDR, STR
- LDM, STM

Branching:
- B, BL

Other:
- ADR
- SWI

ARM CONDITION CODES

AL	Always (The default)
NV	Never
EQ	Equals (Z set)
NE	Not equals (Z clear)
CC	Carry clear
CS	Carry set
MI	Minus (N set, i.e bit 31)
PL	Plus (N clear)
VS	Overflow set
VC	Overflow clear

For comparing unsigned numbers:

LO	Lower than (same as CC)
HS	Higher/Same (same as CS)
HI	Higher (C set, Z clear)
LS	Lower/Same (C clear, Z set)

For comparing signed numbers:

LT	Less than
GE	Greater/Equal
GT	Greater than
LE	Less/Equal

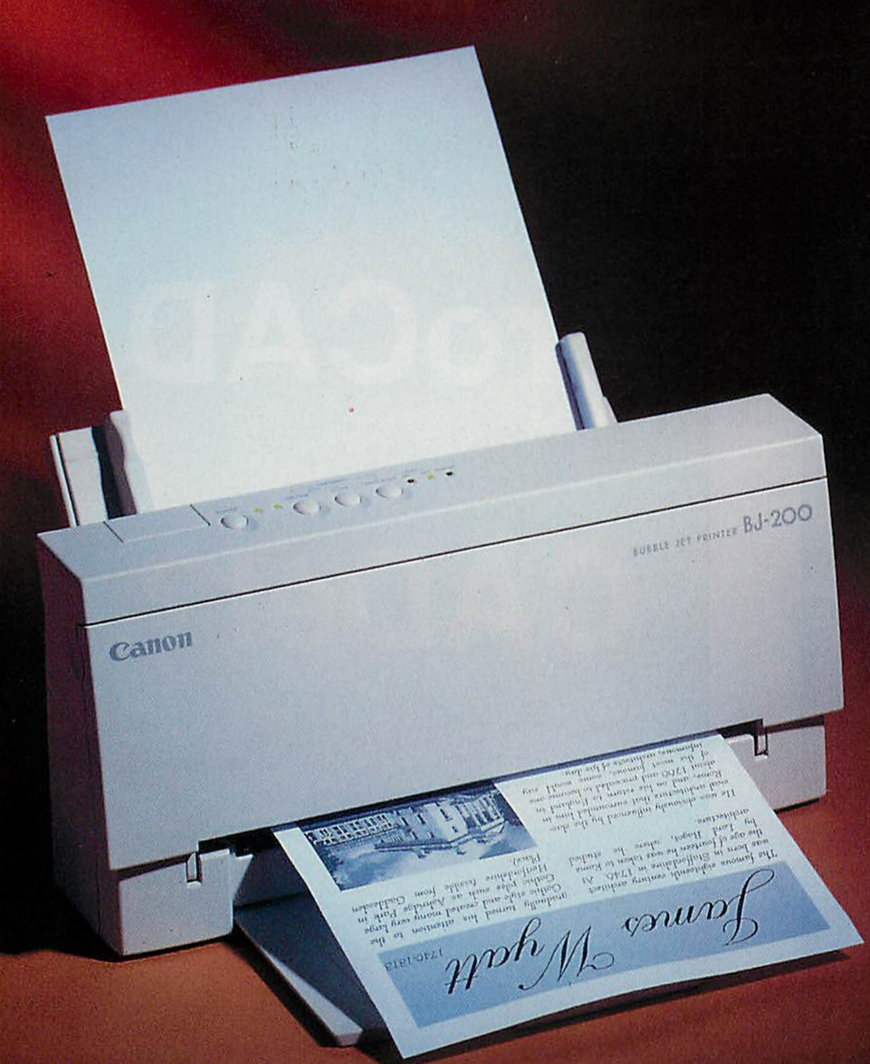
LDM/STM SUFFIXES

STMFD	STMDB	❷
LDMFD	LDMIA	❸
STMFA	STMIB	❶
LDMFA	LDMDA	❹
STMED	STMDA	❹
LDMED	LDMIB	❶
STMEA	STMIA	❸
LDMEA	LDMDB	❷

LDM/STM TYPES

❶ ADD reg,reg,#4 : LDR a,[reg]
❷ SUB reg,reg,#4 : LDR a,[reg]
❸ LDR a,[reg] : ADD reg,reg,#4
❹ LDR a,[reg] : SUB reg,reg,#4

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Time to get control back - ARM2	832	155	5.4
Last page completed - ARM2	834	232	3.6



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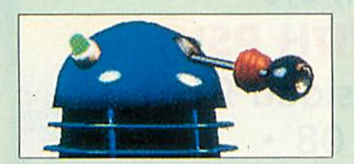
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MENU
The Acorn User disc menu makes the subscriber's disc a pleasure to use. Run the programs of your choice quickly and easily or, if you're perplexed, get instant on-line help



DALEK
Time to hide behind the sofa. Well, please don't, because Peter Clements' Dalek animation, complete with sampled sound effects and ray traced graphics, is a joy to behold. The application has been compressed using Computer Concepts' Compression, and decompression is fully automatic. Turn to page 68 to find out how Peter recreated the scourge from planet Skaro



ROCKY TRADE
Our popular Games Designer series reaches an awesome climax, featuring a complete arcade game designed using our system. Scroll that landscape and blast the living daylights out of anything that moves. Best of all, you can program your own fast scroller using the system. We'll be interested to see how your offerings compare with ours. Check it out on page 98.



PONG
Once upon a time microcomputers, arcade games, bank dispensers and microwave dinners were just a twinkle in someone's eye. Now you can recreate those heroic first days of computer gaming with our deluxe 32-bit version of one of the classics, all the way from 1972. Sprites? Sampled sound? Scrolling? Who needs them . . . Turn to page 93 for a rewarding, life-enhancing experience



*INFO
You could say this contains the usual concoction of the wacky and wonderful, but there's nothing predictable about this month's *INFO. From Jan Vibe's computer-generated cabbages to the artificial intelligence routines underlying Barry Wickett's board game *Squiggle*, there are ideas here in massive profusion. You'll find this phantasmagoric feast on page 103

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COMPATIBILITY CHART

Use this chart to check if a program will work on your machine. There are two columns, one for eight-bit machines like the Model B and Master 128, and one for 32-bit machines, like the A3000, A400 or A3010. If there is a star for the program in the column then it will work on your machine. Special exceptions and hardware requirements are listed as foot notes at the end of the table.

Article	Program Name	8-bit	32-bit
BJÖRN AGAIN (page 93)			
Pong	*Pong*		*
***INFO (page 103)**			
Info1	*Graduate*		*
Info2	*Select*		*
Info3	*RGBcube*		*
Info4	*HSVcone*		*
Info5	*CIE*		*
Info6	*Interpol*		*
Info7	*Snake*		*
Info8	*Top*		*
Info9	*Cabbage*		*
Info10	*Pulsar*		*
Info11	*QuasiJ+M*		*
Info12	*Squiggle1*		*
Info13	*Dancer*		*
Info14	*Skater*		*

*INFO

Listing Info1

```
   10 REM     >Graduate (Info1)
   20 REM By  Michiel van Schaik
   30 REM For 32-bit machines (RO3.1)
   40 REM (c) BAU May 1993
   50 :
   60 MODE 15
   70 OFF
   80 SYS "OS_SWINumberFromString",,"Col
ourTrans_SetGCOL" TO set_gcol%
   90 step%=4
  100 FOR dither%=0 TO 1
  110  ORIGIN 640*dither%,0
  120  action%=dither%*&100
  130  FOR red%=0 TO 255 STEP step%
  140   FOR green%=0 TO 255 STEP step%
  150    col%=(red%<<16)+(green%<<8)
  160    SYS set_gcol%,(red%<<8)+(green%
<<16),,,action%,0
  170    RECTANGLE FILL red%*2,green%*2,
2*step%-1
  180   NEXT green%
  190  NEXT red%
  200 NEXT dither%
  210 END
```

Listing Info2

```
   10 REM     >Select (Info2)
   20 REM By  Michiel van Schaik
   30 REM For 32-bit machines (RO3.1)
   40 REM (c) BAU May 1993
   50 :
   60 MODE 15
   70 IF MODE=21 VDU 23,17,7,%110,8;16;0
,0
   80 *POINTER 1
   90 MOUSE ON 1
  100 PROCinit
  110 PROCrgb_to_hsv
  120 PROCrgb_to_cmyk
  130 PROCdrawbars
  140 REPEAT
  150  MOUSE x%,y%,b%
  160  IF (b% AND 5)>0 PROCclick(x%,y%)
  170 UNTIL (b% AND 7)=7
  180 MODE 0
  190 END
  200 :
  210 DEF PROCinit
  220 DIM x%(9),y%(9),l%(9),c%(9),v%(9),
bar$(9)
  230 x%()=656,656,656,96,96,656,96,656,
96,656
  240 y%()=864,736,608,448,320,320,160,1
60,32,32
  250 l%()=511,511,511,1071,511,511,511,
511,511,511
  260 c%()=&0000F000,&00F00000,&F0000000
,&F0F0F000,&F0F0F000,&F0F0F000,&F0F00000
,&F000F000,&00F0F000,&00000000
  270 v%()=255,255,255,0,0,255,0,0,0,0
  280 bar$()="Red","Green","Blue","Hue",
"Saturation","Value","Cyan","Magenta","Y
ellow","Key" _
  290 VDU 5
  300 SYS "ColourTrans_SetGCOL",&5050500
0,,,0,0
  310 RECTANGLE FILL 80,592,544,408
  320 RECTANGLE FILL 80,16,1136,272
  330 RECTANGLE FILL 80,304,1136,272
  340 RECTANGLE FILL 640,592,576,408
  350 FOR i%=0 TO 9
  360  SYS "ColourTrans_SetGCOL",&808080
00,,,0,0
  370  RECTANGLE FILL x%(i%),y%(i%),l%(i
%)+32,112
  380  SYS "ColourTrans_SetGCOL",&F0F0F0
00,,,0,0
  390  MOVE x%(i%)+16,y%(i%)+96
  400  PRINT bar$(i%)
  410 NEXT i%
  420 ENDPROC
  430 :
  440 DEF PROCshowcolour
  450 SYS "ColourTrans_SetGCOL",(v%(2)<<
24)+(v%(1)<<16)+(v%(0)<<8),,,&100,0
  460 RECTANGLE FILL 96,608,512,376
  470 ENDPROC
  480 :
  490 DEF PROCdrawbars
  500 LOCAL i%,len%
  510 FOR i%=0 TO 9
  520  MOVE x%(i%)+16,y%(i%)+16
  530  IF i%=3 THEN len%=v%(3)*3 ELSE le
n%=v%(i%)*2
  540  SYS "ColourTrans_SetGCOL",c%(i%),
,,&100,0
  550  PLOT 97,len%,32
  560  SYS "ColourTrans_SetGCOL",&505050
00,,,0,0
  570  PLOT 97,l%(i%)-len%,-32
  580  SYS "ColourTrans_SetGCOL",&808080
00,,,0,0
  590  MOVE BY 0,48
  600  PLOT 97,-16*LENSTR$(v%(i%))-64,32
  610  SYS "ColourTrans_SetGCOL",&F0F0F0
00,,,0,0
  620  PRINT;"    ";v%(i%)
  630 NEXT i%
  640 ENDPROC
  650 :
  660 DEF PROCclick(x%,y%)
  670 type%=-1
  680 FOR t%=0 TO 9
  690  IF x%>=x%(t%) AND x%<=x%(t%)+l%(t
%)+32 AND y%>=y%(t%) AND y%<=y%(t%)+64 T
HEN type%=t%
  700 NEXT
  710 IF type%<>-1 THEN
  720  x%=x%-x%(type%)-16
  730  IF type%=3 x%=x% DIV 3 ELSE x%=x%
 DIV 2
  740  IF type%=3 max%=359 ELSE max%=255
  750  IF x%<0 x%=0 ELSE IF x%>max% x%=m
ax%
  760  v%(type%)=x%
  770  CASE type% OF
  780    WHEN 0,1,2:
  790     PROCrgb_to_hsv
  800     PROCrgb_to_cmyk
  810    WHEN 3,4,5:
  820     PROChsv_to_rgb
  830     PROCrgb_to_hsv
  840     PROCrgb_to_cmyk
  850    WHEN 6,7,8,9:
  860     PROCcmyk_to_rgb
  870     PROCrgb_to_cmyk
  880     PROCrgb_to_hsv
  890  ENDCASE
  900  PROCdrawbars
  910  PROCshowcolour
  920 ENDIF
  930 ENDPROC
  940 :
  950 DEF PROChsv_to_rgb
  960 IF v%(3)=0 AND v%(4)=0 THEN v%(4)=
1
  970 SYS "ColourTrans_ConvertHSVToRGB",
v%(3)*&10000,v%(4)*&100,v%(5) TO v%(0),v
%(1),v%(2)
  980 ENDPROC
  990 :
 1000 DEF PROCrgb_to_hsv
 1010 SYS "ColourTrans_ConvertRGBToHSV",
v%(0),v%(1),v%(2) TO v%(3),v%(4),v%(5)
 1020 v%(3)=v%(3) DIV &10000:v%(4)=v%(4)
 DIV &100
 1030 ENDPROC
 1040 :
 1050 DEF PROCrgb_to_cmyk
 1060 SYS "ColourTrans_ConvertRGBToCMYK"
,v%(0),v%(1),v%(2) TO v%(6),v%(7),v%(8)
,v%(9)
 1070 v%(9)=v%(9)-&FF01
 1080 ENDPROC
 1090 :
 1100 DEF PROCcmyk_to_rgb
 1110 SYS "ColourTrans_ConvertCMYKToRGB"
,v%(6),v%(7),v%(8),&FF01+v%(9) TO v%(0),
v%(1),v%(2)
 1120 ENDPROC
```

Listing Info3

```
   10 REM     >RGBcube (Info3)
   20 REM By  DCA
   30 REM For 32-bit machines (RO3.1)
   40 REM (c) BAU May 1993
   50 :
   60 MODE 15
   70 OFF
   80 SYS "OS_SWINumberFromString",,"Col
ourTrans_SetGCOL" TO set_gcol%
   90 step=1/8
  100 rot=RAD(130)
  110 ORIGIN 640,1200
  120 FOR r=0 TO 1 STEP step
  130  FOR g=0 TO 1 STEP step
  140   FOR b=0 TO 1 STEP step
  150    SYS set_gcol%,((r*&FF)<<8)+((g*
&FF)<<16)+((b*&FF)<<24),,,&100,0
  160    xx=r-0.5
  170    zz=g-0.5
  180    x=xx*COS(rot)+zz*SIN(rot)
  190    z=3+xx*-SIN(rot)+zz*COS(rot)
  200    y=b-1.5
  210    x1=1800*x/z
  220    y1=1800*y/z
  230    CIRCLE FILL x1,y1,8
  240   NEXT
  250  NEXT
  260 NEXT
  270 END
```

Listing Info4

```
   10 REM     >HSVcone (Info4)
   20 REM By  DCA
   30 REM For 32-bit machines (RO3.1)
   40 REM (c) BAU May 1993
   50 :
   60 MODE 15
   70 OFF
   80 SYS "OS_SWINumberFromString",,"Col
ourTrans_ConvertHSVToRGB" TO hsv_to_rgb%
   90 SYS "OS_SWINumberFromString",,"Col
ourTrans_SetGCOL" TO set_gcol%
  100 v_step=0.2
  110 ORIGIN 640,1200
  120 FOR v=v_step TO 1 STEP v_step
  130  s_step=0.05-0.035*v
  140  FOR s=s_step TO 1 STEP s_step
  150   h_step=3-2.5*v*s
  160   FOR h=0 TO 360-h_step STEP h_ste
p
  170    SYS hsv_to_rgb%,h*&10000,s*&100
00,v*&FF TO r%,g%,b%
  180    SYS set_gcol%,(r%<<8)+(g%<<16)+
(b%<<24),,,&100,0
  190    x=s*v*500*COSRAD(h)
  200    z=2000+s*v*500*SINRAD(h)
  210    y=800*v-1200
  220    x1=2000*x/z
  230    y1=2000*y/z
  240    CIRCLE FILL x1,y1,4
  250   NEXT
  260  NEXT
  270 NEXT
  280 END
```

Listing Info5

```
   10 REM     >CIE (Info5)
   20 REM By  DCA
   30 REM For 32-bit machines (RO3.1)
   40 REM (c) BAU May 1993
   50 :
   60 MODE 13
   70 OFF
   80 size%=1600
```

```
 90 DIM code% &1000
100 sp=13:link=14:pc=15
110 FOR pass%=0 TO 2 STEP 2
120 P%=code%
130 [OPT pass%
140 .cie
150         MVN     r8,#255 ; =&FFFFFF00
160         ADR     r9,div_tab
170         MOV     r5,#0
180 .xloop  SWI     &100+30
190         MOV     r0,r5
200         ADR     r1,str
210         MOV     r2,#8
220         SWI     "XOS_ConvertCardinal1"
230         SWI     "XOS_Write0"
240         MOV     r6,#0
250 .yloop  MOV     r7,#4
260 .zloop  MOV     r0,r5
270         MOV     r1,r6
280         MOV     r2,r7
290         SWI     "ColourTrans_ConvertCIEToRGB"
300         TST     r0,r8
310         TSTEQ   r1,r8
320         TSTEQ   r2,r8
330         BNE     next_z
340         ADD     r10,r5,r6
350         ADD     r10,r10,r7
360         MOV     r0,r0,LSL #8
370         ORR     r0,r0,r1,LSL #16
380         ORR     r0,r0,r2,LSL #24
390         MOV     r1,#0
400         MOV     r2,#0
410         MOV     r3,#&100
420         MOV     r4,#0
430         SWI     "ColourTrans_SetGCOL"
440         LDR     r3,[r9,r10,LSL #2]
450         MUL     r1,r5,r3
460         MUL     r2,r6,r3
470         MOV     r1,r1,ASR #16
480         MOV     r2,r2,ASR #16
490         MOV     r0,#69
500         SWI     "XOS_Plot"
510 .next_z ADD     r7,r7,#1
520         CMP     r7,#256
530         BLT     zloop
540         ADD     r6,r6,#1
550         CMP     r6,#256
560         BLT     yloop
570         SWI     "XOS_ReadEscapeState"
580         MOVCS   pc,link
590         ADD     r5,r5,#1
600         CMP     r5,#256
610         BLT     xloop
620         MOV     pc,link
630
640 .str    EQUS    STRING$(8," ")
650 ]
660 div_tab=P%:P%+=4*&301
670 NEXT pass%
680 !div_tab=0
690 FOR i%=1 TO &300
700  div_tab!(4*i%)=(size%*&10000)/i%
710 NEXT
720 CALL cie
730 END
```

Listing Info6

```
 10 REM     >Interpol (Info6)
 20 REM By  DCA
 30 REM For 32-bit machines (RO3)
 40 REM (c) BAU May 1993
 50 :
 60 MODE 13
 70 OFF
 80 *POINTER 1
 90 DIM rgb%(1,2)
100 FOR i%=0 TO 1
110  FOR j%=0 TO 2
120   rgb%(i%,j%)=RND(256)-1
130  NEXT
140 NEXT
150 steps%=32
160 flags%=&100
170 quit%=FALSE
180 PROCinterpolate
190 PRINTTAB(12,16)"Drag colour bars"
200 PRINTTAB(12,20)"+, - alter steps"
210 PRINTTAB(12,22)"D toggles dither"
220 REPEAT
230  FOR i%=0 TO 1
240   FOR j%=0 TO 2
250    MOUSE mx%,my%,mb%
260    x%=640+(i%*2-1)*460+(j%-1)*80
270    IF ABS(x%-mx%)<20 AND (mb% AND 5)>0 THEN
280     y%=(my%-100) DIV 2
290     IF y%<0 y%=0 ELSE IF y%>255 y%=255
300     rgb%(i%,j%)=y%
310     GCOL 0 TINT 0
320     RECTANGLE FILL x%-20,100+2*rgb%(i%,j%)+4,40,512-(2*rgb%(i%,j%))
330     PROCinterpolate
340    ENDIF
350    GCOL 3<<(2*j%) TINT 192
360    RECTANGLE FILL x%-20,100,40,2*rgb%(i%,j%)
370   NEXT
380  NEXT
390  CASE INKEY$(0) OF
400   WHEN "+","=":IF steps%<256 steps%=steps%<<1:PROCinterpolate
410   WHEN "-","_":IF steps%>4 steps%=steps%>>1:PROCinterpolate
420   WHEN "D","d":flags%=&100-flags%:PROCinterpolate
430   WHEN "Q","q":quit%=TRUE
440  ENDCASE
450 UNTIL quit%
460 CLS
470 END
480 :
490 DEF PROCinterpolate
500 LOCAL s,col%,j%,k%,width%
510 width%=1280 DIV steps%
520 FOR k%=0 TO steps%-1
530  s=k%/(steps%-1)
540  col%=0
550  FOR j%=0 TO 2
560   col%=col%+((rgb%(0,j%)+s*(rgb%(1,j%)-rgb%(0,j%)))<<(8+8*j%))
570  NEXT
580  SYS "ColourTrans_SetGCOL",col%,,flags%
590  RECTANGLE FILL k%*width%,640,width%,300
600 NEXT
610 ENDPROC
```

Listing Info7

```
 10 REM     >Snake (Info7)
 20 REM By  Jan Vlietinck
 30 REM For 32-bit machines
 40 REM (c) BAU May 1993
 50 :
 60 MODE 13
 70 OFF
 80 PROCinit
 90 PROCass
100 PROCmain
110 END
120 :
130 DEF PROCmain
140 MOUSE A%,B%,but%
150 REPEAT
160  E%=RND(8)/RND(4)*256
170  F%=RND(4)
180  REPEAT
190   SYS "OS_Byte",&70,bank%
200   CLS
210   last_but%=but%
220   MOUSE A%,B%,but%
230   CALL snake
240   WAIT
250   SYS "OS_Byte",&71,bank%
260   bank%=bank% EOR 3
270   G%+=2
280  UNTIL but% AND last_but%<>but%
290 UNTIL FALSE
300 ENDPROC
310 :
320 DEF PROCinit
330 DIM cs 512*4,sn 512*4
340 a=400*64
350 b=300*64
360 FOR i=0 TO 2048 STEP 4
370  h=i*PI/1024
380  cs!i=COS(h)*a
390  sn!i=SIN(h)*b
400 NEXT
410 C%=cs
420 D%=sn
430 bank%=2
440 G%=0
450 ENDPROC
460 :
470 DEF PROCass
480 a=0:b=1:scr=2:cs=2
490 c=3:sn=3:f=4:g=5
500 s=6:k=6:h=7:x=8:y=9
510 r=10:m=11:t=12
520 sp=13:link=14:pc=15
530 DIM q% 4000
540 FOR pass=0 TO 2 STEP 2
550 P%=q%
560 [OPT pass
570 .screen1
580         EQUD    148
590         EQUD    -1
600 .screen EQUD    0
610
620 .set    STMFD   (sp)!,{r0-r1,link}
630         ADR     r0,screen1
640         ADR     r1,screen
650         SWI     "OS_ReadVduVariables"
660         LDMFD   (sp)!,{r0-r1 ,pc}
670
680 .snake  STMFD   (sp)!,{link }
690         BL      set
700         RSB     b,b,#1024
710         MOV     h,#0
720         MOV     m,#512
730         SUB     m,m,#1
740 .for    MUL     t,f,h
750         ADD     t,k,t,ASR #8
760         ADD     t,t,#130
770         AND     t,t,m
780         LDR     t,[cs,t,LSL #2]
790         ADD     x,t,a,LSL #6
800         ADD     t,h,k
810         ADD     t,t,k,LSR #3
820         AND     t,t,m
830         LDR     t,[sn,t,LSL #2]
840         ADD     y,t,b,LSL #6
850         MLA     t,g,h,k
860         AND     t,t,m
870         LDR     t,[sn,t,LSL #2]
880         ADD     r,t,#160*256
890         MOV     r,r,ASR #1
900         STMFD   (sp)!,{0-12 }
910         LDR     scr,screen
920         ADD     scr,scr,#8
930         ADD     scr,scr,#8*320
940         MOV     c,#255
950         BL      star
960         LDMFD   (sp)!,{0-12 }
970         ADD     h,h,#16
980         CMP     h,#512
990         BLO     for
1000        LDMFD   (sp)!,{pc }
1010
1020 .star  MOV     r,r,LSR #2
1030        CMP     r,#2*256
1040        BHI     skip
1050        CMP     x,#(320-16) <<8
1060        CMPLO   y,#(256-16) <<8
1070        MOVHS   pc,link
1080        SUB     a,x,r
1090        MOV     b,y,ASR #8
1100        ADD     t,b,b,LSL #2
1110        ADD     t,scr,t,LSL #6
1120        STRB    c,[t,a,ASR #8]
1130        ADD     a,a,r,LSL #1
1140        STRB    c,[t,a,ASR #8]
1150        SUB     h,r,r,LSR #3
1160        SUB     a,x,r,LSR #1
1170        ADD     b,y,h
1180        MOV     b,b,ASR #8
1190        ADD     t,b,b,LSL #2
1200        ADD     t,scr,t,LSL #6
1210        STRB    c,[t,a,ASR #8]
1220        ADD     a,a,r
1230        STRB    c,[t,a,ASR #8]
1240        SUB     b,y,h
1250        MOV     b,b,ASR #8
1260        ADD     t,b,b,LSL #2
1270        ADD     t,scr,t,LSL #6
1280        STRB    c,[t,a,ASR #8]
1290        SUB     a,a,r
1300        STRB    c,[t,a,ASR #8]
1310        MOV     pc,link
1320
1330 .skip  STMFD   (sp)!,{x,y,r,link}
1340        ADD     x,x,r
1350        BL      star
1360        LDMFD   sp,{x ,y,r}
1370        SUB     x,x,r
1380        BL      star
1390        LDMFD   sp,{x ,y,r}
1400        SUB     x,x,r,LSR #1
1410        ADD     y,y,r
1420        SUB     y,y,r,LSR #3
1430        BL      star
1440        LDMFD   sp,{x ,y,r}
1450        ADD     x,x,r,LSR #1
1460        ADD     y,y,r
1470        SUB     y,y,r,LSR #3
1480        BL      star
1490        LDMFD   sp,{x ,y,r}
1500        SUB     x,x,r,LSR #1
1510        SUB     y,y,r
1520        ADD     y,y,r,LSR #3
1530        BL      star
1540        LDMFD   (sp)!,{x ,y,r}
1550        ADD     x,x,r,LSR #1
1560        SUB     y,y,r
1570        ADD     y,y,r,LSR #3
1580        BL      star
1590        LDMFD   (sp)!,{pc }
1600 ]
1610 NEXT
1620 ENDPROC
```

Listing Info8

```
 10 REM     >Top (Info8)
 20 REM By  Jan Vlietinck
 30 REM For 32-bit machines
 40 REM (c) BAU May 1993
 50 :
 60 PROCinit
 70 PROCmain
 80 END
 90 :
100 DEF PROCmain
110 REPEAT
120  PROCcalc
130  SYS "OS_Byte",&70,bank
140  CLS
150  CALL begin
160  WAIT
170  SYS "OS_Byte",&71,bank
180  bank=bank EOR 3
190  MOUSE x,y,b
200  hx=(y/512-1)*PI/2
210  hy=(x/640-1)*PI/2
220 UNTIL FALSE
230 ENDPROC
240 :
250 DEF PROCinit
260 MODE 15
270 MODE 13
280 PRINT "Please Wait"
290 COLOUR 128+100
300 MOUSE ON
310 *POINTER
320 m1=40
330 m2=60
340 DIM f(m1)
350 nrd=m1*m2
360 OFF
370 DIM rx(2,2),ry(2,2),rz(2,2),t(2,2)
380 PROCquadrangle
390 PROCass
400 PROCvul
410 !k1=255
420 hx=0
430 hy=0
440 hz=0
450 bank=1
460 ENDPROC
470 :
480 DEF PROCcalc
490 rx()=1,0,0,0,COShx,SINhx,0,-SINhx,COShx
500 ry()=COShy,0,SINhy,0,1,0,-SINhy,0,COShy
510 rz()=COShz,SINhz,0,-SINhz,COShz,0,0,0,1
520 t()=rx().ry()
530 t()=t().rz()
540 v=2^15
550 t()=t()*v
560 tr!0=t(0,0)
570 tr!4=t(0,1)
580 tr!8=t(0,2)
590 tr!12=t(1,0)
600 tr!16=t(1,1)
610 tr!20=t(1,2)
620 ENDPROC
630 :
640 DEF PROCvul
650 p=lijst
660 FOR i=0 TO m1-1
670  h=i*PI/(m1-1)
680  f(i)=SINh*1600
690 NEXT
700 FOR j=0 TO m1-1
710  k=(j-m1/2)*PI/m1*600
720  FOR i=0 TO m2-1
730   h=i*PI*2/(m2-1)
740   !p=f(j)*COSh
750   p+=4
760   !p=f(j)*SINh
770   p+=4
780   !p=k
790   p+=4
800  NEXT
810 NEXT
820 !p=-1
830 p=lijst+!nr+8
840 q=lijst
850 FOR j=0 TO m1-1
860  FOR i=0 TO m2-1
870   t=q+12*m2
880   x3=!t
890   y3=t!4
900   z3=t!8
910   t+=12
920   x4=!t
930   y4=t!4
940   z4=t!8
950   x1=!q
960   y1=q!4
970   z1=q!8
980   q+=12
990   x2=!q
1000  y2=q!4
1010  z2=q!8
1020  IF x1=x2 AND y1=y2 THEN
1030   x2=x4
1040   y2=y4
1050  ENDIF
1060  a1=x1-x3
```

```
1070  a2=y1-y3
1080  a3=z1-z3
1090  b1=x2-x3
1100  b2=y2-y3
1110  b3=z2-z3
1120  c1=a2*b3-b2*a3
1130  c2=a3*b1-b3*a1
1140  c3=a1*b2-b1*a2
1150  d=SQR(c1*c1+c2*c2+c3*c3)
1160  IF d<>0 !p=2^20/d
1170  p+=12
1180  NEXT
1190 NEXT
1200 ENDPROC
1210 :
1220 DEF PROCass
1230 DIM q% 120000
1240 x=0:y=1:z=2:s11=3
1250 s12=4:s13=5:s21=6:s22=7:s23=8
1260 c=9:t=10:u=11:v=12
1270 a=13:b=14
1280 x1=0:y1=1:x2=2:y2=3
1290 x3=4:y3=5:x4=6:y4=7
1300 col=8:i=9:j=12
1310 FOR pass=0 TO 2 STEP 2
1320 P%=q%
1330 [OPT pass
1340 .tr     EQUS    STRING$(24,CHR$0)
1350 .spst   EQUD    0
1360 .linkst EQUD    0
1370 .nr     EQUD    (nrd+800)*12
1380
1390 .begin
1400         STR     sp,spst
1410         STR     link,linkst
1420         ADR     t,tr
1430         LDMIA   t,{r3-r8 }
1440         ADR     a,lijst
1450         LDR     b,nr
1460         ADD     b,b,a
1470 .trans  LDMIA   (a)!,{x ,y,z}
1480         MUL     t,x,s11
1490         MLA     t,y,s12,t
1500         MLA     t,z,s13,t
1510         MOV     u,t,ASR #15
1520         MUL     t,x,s21
1530         MLA     t,y,s22,t
1540         MLA     t,z,s23,t
1550         MOV     v,t,ASR #15
1560         STMIA   (b)!,{u ,v}
1570         ADD     b,b,#4
1580         CMN     x,#1
1590         BNE     trans
1600         STR     x,[b]
1610         LDR     13,spst
1620         LDR     link,linkst
1630         STMFD   (sp)!,{link }
1640         BL      set
1650 .pl     ADR     u,lijst
1660         LDR     t,nr
1670         ADD     u,u,t
1680         MOV     i,#m1-1
1690         STR     i,id
1700 .lo2    MOV     j,#m2-1
1710 .lo1    ADD     t,u,#m2<<3
1720         ADD     t,t,#m2<<2
1730         LDMIA   (t)!,{x3 ,y3}
1740         ADD     t,t,#4
1750         LDMIA   (u)!,{x1 ,y1,col}
1760         CMP     col,#0
1770         LDMMIFD (sp)!,{pc }
1780         LDMIA   u,{x2 ,y2}
1790         CMP     x1,x2
1800         CMPEQ   y1,y2
1810         LDMEQIA t,{x2 ,y2}
1820         SUB     x4,x1,x3
1830         SUB     y4,y2,y3
1840         MUL     i,y4,x4
1850         SUB     x4,x2,x3
1860         SUB     y4,y1,y3
1870         MUL     x4,y4,x4
1880         RSBS    i,x4,i
1890         BMI     ov
1900         LDMIA   t,{x4 ,y4}
1910         MUL     col,i,col
1920         MOVS    i,col,LSR #16
1930         ADR     t,kol
1940         LDR     col,[t,i,LSL #2]
1950         STMFD   (sp)!,{r8-r12 }
1960         MOV     t,#160
1970         ADD     x1,t,x1,ASR #4
1980         ADD     x2,t,x2,ASR #4
1990         ADD     x3,t,x3,ASR #4
2000         ADD     x4,t,x4,ASR #4
2010         MOV     t,#128
2020         SUB     y1,t,y1,ASR #4
2030         SUB     y2,t,y2,ASR #4
2040         SUB     y3,t,y3,ASR #4
2050         SUB     y4,t,y4,ASR #4
2060         BL      quadrangle
2070         LDMFD   (sp)!,{r8-r12 }
2080 .ov     SUBS    j,j,#1
2090         BNE     lo1
2100         ADD     u,u,#12
2110         LDR     i,id
2120         SUBS    i,i,#1
2130         STR     i,id
2140         BNE     lo2
2150         LDMFD   (sp)!,{pc }
2160
2170 .id     EQUD    0
2180
2190 .kol    EQUD    %00000000
2200         EQUD    %00000001
2210         EQUD    %00000010
2220         EQUD    %00000011
2230         EQUD    %00101100
2240         EQUD    %00101101
2250         EQUD    %00101110
2260         EQUD    %00101111
2270         EQUD    %11010000
2280         EQUD    %11010001
2290         EQUD    %11010010
2300         EQUD    %11010011
2310         EQUD    %11111100
2320         EQUD    %11111101
2330         EQUD    %11111110
2340         EQUD    %11111111
2350         EQUD    %11111111
2360         EQUD    %11111111
2370         EQUD    %11111111
2380         EQUD    %11111111
2390         EQUD    %11111111
2400 .lijst
2410 ]
2420 NEXT
2430 ENDPROC
2440 :
2450 DEF PROCquadrangle
2460 DIM ditable 4*320
2470 FOR I=1 TO 320
2480  ditable!(4*I)=(1<<16)/I
2490 NEXT
2500 DIM q% 2000
2510 ax=0:ay=1:bx=2:by=3
2520 cx=4:cy=5:dx=6:dy=7
2530 col=8:t=9
2540 a=10:b=11:c=12
2550 f=8:g=9:t=9:n=10
2560 q=11:s=12
2570 xl=0:xr=1:l=2:r=3:ct=4
2580 c1=5:c2=6:c3=7:c4=8
2590 t=9:o=10:la=11:ra=12
2600 sp=13:link=14:pc=15
2610 FOR p=0 TO 2 STEP 2
2620 P%=q%
2630 [OPT p
2640 .screen1
2650         EQUD    148
2660         EQUD    -1
2670 .screen EQUD    0
2680
2690 .set    ADR     r0,screen1
2700         ADR     r1,screen
2710         SWI     "OS_ReadVduVariabl
es"
2720         MOV     pc,link
2730
2740 .axd    EQUD    0
2750 .bxd    EQUD    0
2760 .cxd    EQUD    0
2770 .ab     EQUD    0
2780 .ac     EQUD    0
2790 .bd     EQUD    0
2800 .cd     EQUD    0
2810 .ad     EQUD    0
2820 .bc     EQUD    0
2830 .aa     EQUD    0
2840 .bb     EQUD    0
2850 .cc     EQUD    0
2860 .kl     EQUD    0
2870 .ditabd EQUD    ditable
2880
2890 .quadrangle
2900         STMFD   (sp)!,{link }
2910         STR     col,kl
2920         FNmax(ax,ay,bx,by)
2930         FNmax(bx,by,cx,cy)
2940         FNmax(cx,cy,dx,dy)
2950         FNmax(ax,ay,bx,by)
2960         FNmax(bx,by,cx,cy)
2970         FNmax(ax,ay,bx,by)
2980         STR     ax,axd
2990         STR     bx,bxd
3000         STR     cx,cxd
3010         SUB     a,dx,ax
3020         SUB     b,dy,ay
3030         SUB     s,cx,ax
3040         SUB     t,cy,ay
3050         MUL     t,a,t
3060         MUL     s,b,s
3070         SUBS    f,s,t
3080         BEQ     q1
3090         SUB     s,bx,ax
3100         SUB     t,by,ay
3110         MUL     t,a,t
3120         MUL     s,b,s
3130         SUBS    g,s,t
3140         BEQ     q1
3150         EORS    t,f,g
3160         BLT     q1
3170         BGE     q2
3180 .q1     LDR     q,ditabd
3190         SUB     t,bx,ax
3200         SUB     n,by,ay
3210         LDR     n,[q,n,LSL #2]
3220         MUL     n,t,n
3230         MOV     n,n,ASR #10
3240         STR     n,ab
3250         SUB     t,cx,ax
3260         SUB     n,cy,ay
3270         LDR     n,[q,n,LSL #2]
3280         MUL     n,t,n
3290         MOV     n,n,ASR #10
3300         STR     n,ac
3310         SUB     t,dx,bx
3320         SUB     n,dy,by
3330         LDR     n,[q,n,LSL #2]
3340         MUL     n,t,n
3350         MOV     n,n,ASR #10
3360         STR     n,bd
3370         SUB     t,dx,cx
3380         SUB     n,dy,cy
3390         LDR     n,[q,n,LSL #2]
3400         MUL     n,t,n
3410         MOV     n,n,ASR #10
3420         STR     n,cd
3430         SUB     a,by,ay
3440         SUB     b,cy,by
3450         SUB     c,dy,cy
3460         STR     a,aa
3470         STR     b,bb
3480         STR     c,cc
3490         LDR     o,screen
3500         LDR     col,kl
3510         ADD     t,ay,ay,LSL #2
3520         ADD     o,o,t,LSL #6
3530         ADD     c4,c4,c4,LSL #8
3540         ADD     c4,c4,c4,LSL #16
3550         MOV     c1,c4
3560         MOV     c2,c4
3570         MOV     c3,c4
3580         LDR     ct,aa
3590         CMP     ct,#0
3600         LDR     t,axd
3610         MOV     l,t,LSL #6
3620         MOV     r,t,LSL #6
3630         LDR     la,ac
3640         ADD     l,l,la,ASR #1
3650         ADD     l,l,#1<<5
3660         LDR     ra,ab
3670         ADD     r,r,ra,ASR #1
3680         ADD     r,r,#1<<5
3690         BLNE    piece
3700         LDR     ct,bb
3710         CMP     ct,#0
3720         LDR     t,bxd
3730         MOV     r,t,LSL #6
3740         LDR     ra,bd
3750         ADD     r,r,ra,ASR #1
3760         ADD     r,r,#1<<5
3770         BLNE    piece
3780         LDR     ct,cc
3790         CMP     ct,#0
3800         LDR     t,cxd
3810         MOV     l,t,LSL #6
3820         LDR     la,cd
3830         ADD     l,l,la,ASR #1
3840         ADD     l,l,#1<<5
3850         BLNE    piece
3860         LDMFD   (sp)!,{pc }
3870
3880 .q2     LDR     q,ditabd
3890         SUB     t,bx,ax
3900         SUB     n,by,ay
3910         LDR     n,[q,n,LSL #2]
3920         MUL     n,t,n
3930         MOV     n,n,ASR #10
3940         STR     n,ab
3950         SUB     t,cx,bx
3960         SUB     n,cy,by
3970         LDR     n,[q,n,LSL #2]
3980         MUL     n,t,n
3990         MOV     n,n,ASR #10
4000         STR     n,bc
4010         SUB     t,dx,cx
4020         SUB     n,dy,cy
4030         LDR     n,[q,n,LSL #2]
4040         MUL     n,t,n
4050         MOV     n,n,ASR #10
4060         STR     n,cd
4070         SUB     t,dx,ax
4080         SUB     n,dy,ay
4090         LDR     n,[q,n,LSL #2]
4100         MUL     n,t,n
4110         MOV     n,n,ASR #10
4120         STR     n,ad
4130         SUB     a,by,ay
4140         SUB     b,cy,by
4150         SUB     c,dy,cy
4160         STR     a,aa
4170         STR     b,bb
4180         STR     c,cc
4190         LDR     o,screen
4200         LDR     col,kl
4210         ADD     t,ay,ay,LSL #2
4220         ADD     o,o,t,LSL #6
4230         ADD     c4,c4,c4,LSL #8
4240         ADD     c4,c4,c4,LSL #16
4250         MOV     c1,c4
4260         MOV     c2,c4
4270         MOV     c3,c4
4280         LDR     ct,aa
4290         CMP     ct,#0
4300         LDR     t,axd
4310         MOV     l,t,LSL #6
4320         MOV     r,t,LSL #6
4330         LDR     la,ad
4340         ADD     l,l,la,ASR #1
4350         ADD     l,l,#1<<5
4360         LDR     ra,ab
4370         ADD     r,r,ra,ASR #1
4380         ADD     r,r,#1<<5
4390         BLNE    piece
4400         LDR     ct,bb
4410         CMP     ct,#0
4420         LDR     t,bxd
4430         MOV     r,t,LSL #6
4440         LDR     ra,bc
4450         ADD     r,r,ra,ASR #1
4460         ADD     r,r,#1<<5
4470         BLNE    piece
4480         LDR     ct,cc
4490         CMP     ct,#0
4500         LDR     t,cxd
4510         MOV     r,t,LSL #6
4520         LDR     ra,cd
4530         ADD     r,r,ra,ASR #1
4540         ADD     r,r,#1<<5
4550         BLNE    piece
4560         LDMFD   (sp)!,{pc }
4570
4580 .piece  STMFD   (sp)!,{link }
4590 .lo     CMP     l,r
4600         ADDLO   xl,o,l,LSR #6
4610         ADDLO   xr,o,r,LSR #6
4620         ADDHS   xl,o,r,LSR #6
4630         ADDHS   xr,o,l,LSR #6
4640         SUBS    t,xr,xl
4650         BEQ     endspan
4660         CMP     t,#2
4670         STRLSB  c1,[xl]
4680         STRLSB  c1,[xr,#-1]
4690         BLS     endspan
4700         TST     xl,#%01
4710         STRNEB  c1,[xl],#1
4720         TST     xl,#%10
4730         STRNEB  c2,[xl],#1
4740         STRNEB  c1,[xl],#1
4750         TST     xr,#%01
4760         STRNEB  c2,[xr,#-1]!
4770         TST     xr,#%10
4780         STRNEB  c1,[xr,#-1]!
4790         STRNEB  c2,[xr,#-1]!
4800         SUBS    t,xr,xl
4810         MOVS    t,t,LSR #3
4820         STRCS   c1,[xl],#4
4830         MOVS    t,t,LSR #1
4840         STMCSIA (xl)!,{c1 ,c2}
4850         ADR     xr,base
4860         SUB     pc,xr,t,LSL #2
4870         FNvulc
4880 .base
4890 .endspan
4900         ADD     l,l,la
4910         ADD     r,r,ra
4920         ADD     o,o,#320
4930         SUBS    ct,ct,#1
4940         BNE     lo
4950         LDMFD   (sp)!,{pc }
4960 ]
4970 NEXT
4980 ENDPROC
4990 :
5000 DEF FNvulc
5010 FOR i=1 TO 20
5020 [OPT p
5030         STMIA   (xl)!,{c1
,c2,c3,c4
}
5040 ]
5050 NEXT
5060 =""
5070 :
5080 DEF FNmax(ax,ay,bx,by)
5090 [OPT p
5100         CMP     ay,by
5110         MOVHI   t,ax
5120         MOVHI   ax,bx
5130         MOVHI   bx,t
5140         MOVHI   t,ay
5150         MOVHI   ay,by
5160         MOVHI   by,t
5170 ]
5180 =0
```

Listing Info9

```
10 REM      >Cabbage (Info9)
20 REM By  Jan Vibe
30 REM For 32-bit machines
40 REM (c) BAU May 1993
50 :
60 MODE 13:OFF
```

```
  70 DIM dx(8),dy(8),col(7)
  80 IF MODE=21 step=2 ELSE step=4
  90 FOR i=1 TO 8
 100  READ dx,dy
 110  dx(i)=dx*step
 120  dy(i)=dy*step
 130 NEXT
 140 col()=0,1,4,5,16,17,20,21
 150 REPEAT
 160  FOR i=1 TO 10
 170   rnd1=RND(8)
 180   REPEAT
 190    rnd2=RND(8)
 200   UNTIL rnd2<>rnd1
 210   SWAP dx(rnd1),dx(rnd2)
 220   SWAP dy(rnd1),dy(rnd2)
 230  NEXT
 240  count=0
 250  REPEAT
 260   x=RND(1279)
 270   y=RND(1023)
 280   count+=1
 290  UNTIL POINT(x,y)=0 OR count=5000
 300  IF count<5000 PROCcabbage(x,y,RND
(7),RND(75)+25)
 310 UNTIL count=5000
 320 END
 330 :
 340 DEF PROCcabbage(x,y,col,depth)
 350 LOCAL dir,gcol
 360 gcol=(depth DIV 4) MOD 12+4
 370 GCOL (gcol DIV 4)*col(col) TINT (g
col MOD 4)<<6
 380 POINT x,y
 390 IF depth>=2 THEN
 400  FOR dir=1 TO 8
 410   IF POINT(x+dx(dir),y+dy(dir))=0
PROCcabbage(x+dx(dir),y+dy(dir),col,dept
h-1)
 420  NEXT
 430 ENDIF
 440 ENDPROC
 450 :
 460 DATA -1,-1,0,-1,1,-1,-1,0,1,0,-1,1
,0,1,1,1
```

Listing Info10

```
  10 REM     >Pulsar (Info10)
  20 REM By  Jan Vibe
  30 REM For 32-bit machines
  40 REM (c) BAU May 1993
  50 :
  60 MODE12
  70 PROCshape
  80 PROCinit
  90 ON ERROR PROCerror
 100 PROCdraw
 110 END
 120 :
 130 DEF PROCerror
 140 IF ERR<>17 PRINTREPORT$;" at line
";ERL
 150 END
 160 :
 170 DEF PROCshape
 180 PRINT"1: Square"
 190 PRINT"2: Hexagon"
 200 PRINT"3: Octagon"
 210 PRINT"4: Polygon with 12 sides"
 220 PRINT'"Polygon number ";
 230 *Fx15,0
 240 REPEAT
 250  poly$=GET$
 260 UNTIL INSTR("1234",poly$)>0
 270 poly=VAL(poly$)
 280 CASE poly OF
 290  WHEN 1:ang=0 :rad=512:w=1.0
 300  WHEN 2:ang=30:rad=580:w=1.5
 310  WHEN 3:ang=45:rad=512:w=2.0
 320  WHEN 4:ang=60:rad=512:w=2.5
 330 ENDCASE
 340 ENDPROC
 350 :
 360 DEF PROCinit
 370 ang1=RAD(ang)
 380 ang2=RAD(90)
 390 angs=180/(90-ang)
 400 IFRND(-TIME)
 410 cycle=1
 420 rgb=RND(3)
 430 ctime=TIME
 440 DIM sin(angs),cos(angs),col(15,3),
x(6),y(6),w(6)
 450 FOR i=1 TO angs
 460  a=RAD(2*(90-ang)*i)
 470  sin(i)=SINa
 480  cos(i)=COSa
 490 NEXT
 500 FOR i=1 TO 15
 510  READ col(i,1)
 520  col(i,2)=col(i,1)
 530  col(i,3)=col(i,1)
 540  COLOUR i,col(i,1),col(i,2),col(i,
3)
 550 NEXT
 560 CLS:OFF
 570 CASE MODE OF
 580  WHEN 12,20 : ORIGIN 640,512
 590  WHEN 31    : ORIGIN 800,600
 600 ENDCASE
 610 ENDPROC
 620 :
 630 DATA 16,32,80,112,144,176,208,240,
224,192,160,128,96,64,32
 640 :
 650 DEF PROCdraw
 660 REPEAT
 670  rnd=RND(6)
 680  mul=28/(2*rnd)
 690  FOR i=1 TO rnd
 700   x(i)=RND(rad)
 710   y(i)=RND(rad)
 720   w(i)=w*RND(1)+.5
 730  NEXT
 740  PROCpoly(0,0,rad*SINang1,rad*COSa
ng1,rad*SINang2,rad*COSang2)
 750  when=TIME+1000
 760  REPEAT
 770   PROCcycle
 780  UNTIL TIME>when
 790 UNTIL FALSE
 800 ENDPROC
 810 :
 820 DEF PROCpoly(x1,y1,x2,y2,x3,y3)
 830 LOCAL x12,y12,x23,y23,x31,y31
 840 PROCcycle
 850 IF (x2-x1)^2+(y2-y1)^2>=256 THEN
 860  x12=(x1+x2)/2:y12=(y1+y2)/2
 870  x23=(x2+x3)/2:y23=(y2+y3)/2
 880  x31=(x3+x1)/2:y31=(y3+y1)/2
 890  PROCpoly(x1,y1,x12,y12,x31,y31)
 900  PROCpoly(x12,y12,x2,y2,x23,y23)
 910  PROCpoly(x12,y12,x23,y23,x31,y31)
 920  PROCpoly(x31,y31,x23,y23,x3,y3)
 930 ELSE
 940  xmid=(x1+x2+x3)/3:ymid=(y1+y2+y3)
/3
 950  col=0
 960  FOR i=1 TO rnd
 970    col+=(1+SINRAD(w(i)*SQR((x(i)-xm
id)^2+(y(i)-ymid)^2)))
 980    PROCcycle
 990  NEXT
1000  PROCcol(mul*col+1)
1010  PROCcycle
1020  FOR i=1 TO angs
1030    c1x=x1*cos(i)+y1*sin(i):c1y=y1*c
os(i)-x1*sin(i)
1040    c2x=x2*cos(i)+y2*sin(i):c2y=y2*c
os(i)-x2*sin(i)
1050    c3x=x3*cos(i)+y3*sin(i):c3y=y3*c
os(i)-x3*sin(i)
1060    MOVE c1x, c1y:MOVE c2x, c2y:PLOT
 85,c3x, c3y
1070    MOVE c1x,-c1y:MOVE c2x,-c2y:PLOT
 85,c3x,-c3y
1080    PROCcycle
1090  NEXT
1100 ENDIF
1110 ENDPROC
1120 :
1130 DEF PROCcol(col)
1140 GCOL ABS(14-((col+13)MOD28))+1
1150 ENDPROC
1160 :
1170 DEF PROCcycle
1180 LOCAL i,col
1190 IF TIME-ctime>=8 THEN
1200  IF RND(1)>.6 rgb=RND(3)
1210  col=col(15,rgb)
1220  FOR i=15 TO 2 STEP -1
1230   col(i,rgb)=col(i-1,rgb)
1240  NEXT
1250  col(1,rgb)=col
1260  cycle=cycle MOD 15+1
1270  FOR i=1 TO 15
1280   COLOUR (i+cycle+15)MOD15+1,col(i
,1),col(i,2),col(i,3)
1290  NEXT
1300  ctime=TIME
1310 ENDIF
1320 ENDPROC
```

Listing Info11

```
  10 REM     >QuasiJ+M (Info11)
  20 REM By  Michael Rozdoba
  30 REM For 32-bit machines
  40 REM (c) BAU May 1993
  50 :
  60 scrn%=1
  70 mem%=1024
  80 DIM code% mem%
  90 R%=50
 100 M%=90
 110 :
 120 MODE 0
 130 PRINT "(J)ulia or (M)andelbrot ";
 140 REPEAT
 150  set=INSTR(" JjMm",GET$)DIV2
 160 UNTIL set>0
 170 IF set=1 THEN
 180  PRINT"Julia"
 190  A=-1.12:B=-1.13:I=1.12:J=1.13
 200  INPUT '"Enter m & n (eg 0 & 0.3)
";pm,pn
 210 ELSE
 220  PRINT "Mandelbrot"
 230  A=-.45:B=-1.8:I=2.10:J=1.8
 240  pm=0:pn=0
 250 ENDIF
 260 PROCmode
 270 REPEAT
 280  hinc=(I-A)/hpix
 290  vinc=(J-B)/vpix
 300  IF hinc*vinc=0 PRINT"image size t
oo small":END
 310  PROCcode
 320  CALL doit%
 330  REPEAT
 340   VDU 7
 350   goon=TRUE
 360   CASE GET$ OF
 370    WHEN "S","s":
 380     SYS "OS_CLI","ScreenSave Image
J"+STR$scrn%
 390     scrn%+=1
 400     goon=FALSE
 410    WHEN "I","i":
 420     PRINT "Current co-ordinates
: (";A;",";B;") - (";I;",";J;")"
 430     INPUT "Enter new values (A,B)
: ";A,B
 440     INPUT "                  (I,J)
: ";I,J
 450    WHEN "J","j":
 460     IF set=2 set=1:pm=jm:pn=jn
 470    WHEN "M","m":
 480     IF set=1 set=2:pm=0:pn=0
 490    WHEN "N","n":
 500     PROCmode
 510    WHEN " ":
 520     PROCzoom
 530    OTHERWISE:
 540     goon=FALSE
 550   ENDCASE
 560  UNTIL goon
 570 UNTIL FALSE
 580 END
 590 :
 600 DEF PROCmode
 610 REPEAT
 620  ok=TRUE
 630  VDU30
 640  INPUT '"Screen mode ";mode
 650  SYS "OS_CheckModeValid", mode TO
;F%
 660  log2bpp=FNvar(9)
 670  log2bpc=FNvar(10)
 680  hpix=FNvar(11)+1
 690  vpix=FNvar(12)+1
 700  scrx=hpix<<FNvar(4)
 710  scry=vpix<<FNvar(5)
 720  IF F%AND2 PRINT"Selected mode is
unavailable":ok=FALSE
 730  IF log2bpp<>2 PRINT"Not a 16 colo
ur mode":ok=FALSE
 740  IF log2bpp<>log2bpc PRINT"'Double
 pixel' modes are not allowed":ok=FALSE
 750 UNTIL ok
 760 MODE mode:OFF
 770 RESTORE
 780 FOR i=0 TO 15
 790  READ r,g,b
 800  COLOUR i,r,g,b
 810 NEXT i
 820 ENDPROC
 830 :
 840 DEF PROCzoom
 850 MOUSE ON
 860 s=512
 870 MOUSE x,y,b
 880 GCOL 3,15
 890 RECTANGLE x-s*scrx/(scry<<1),y-s/2
,s*scrx/scry,s
 900 ox=x
 910 oy=y
 920 os=s
 930 REPEAT
 940  MOUSE x,y,b
 950  WAIT
 960  RECTANGLE ox-os*scrx/(scry<<1),oy
-os/2,os*scrx/scry,os
 970  RECTANGLE x-s*scrx/(scry<<1),y-s/
2,s*scrx/scry,s
 980  IF set=2 THEN
 990   jm=A+(I-A)*x/scrx
1000   jn=J-(J-B)*y/scry
1010   PRINT TAB(0,0);"Julia parameter:
";jm;" ";jn;SPC(12);
1020  ENDIF
1030  ox=x:oy=y:os=s
1040  IF b AND 4 s+=2*(s>16)
1050  IF b AND 1 s-=2*(s<scry)
1060 UNTIL b AND 2
1070 w=I-A:h=J-B
1080 I=A+w*(x+s*scrx/(scry<<1))/scrx
1090 B=J-h*(y+s/2)/scry
1100 A=A+w*(x-s*scrx/(scry<<1))/scrx
1110 J=J-h*(y-s/2)/scry
1120 MOUSE OFF
1130 ENDPROC
1140 :
1150 DEF PROCcode
1160 !code%=148
1170 code%!4=-1
1180 SYS"OS_ReadVduVariables",code%,cod
e%
1190 scrst%=!code%
1200 L%=code%+mem%
1210 xc=0
1220 yc=1
1230 x=2
1240 y=3
1250 cc=4
1260 m=5
1270 n=6
1280 r=7
1290 addr=8
1300 FOR opt%=8 TO 10 STEP 2
1310 P%=code%
1320 [OPT opt%
1330 .ar%       EQUD R%*65536
1340 .ax%       EQUD 0
1350 .ay%       EQUD 0
1360 .axo%      EQUD A*65536
1370 .ayo%      EQUD B*65536
1380 .axi%      EQUD hinc*65536
1390 .ayi%      EQUD vinc*65536
1400 .am%       EQUD pm*65536
1410 .an%       EQUD pn*65536
1420 .ascrst%   EQUD scrst%
1430 .asptemp%  EQUD 0
1440 :
1450 .doit%
1460 STMFD R13!,{r14 }
1470 STR   R13,asptemp%
1480 LDR   r,ar%
1490 LDR   m,am%
1500 LDR   n,an%
1510 LDR   addr,ascrst%
1520 ]
1530 IF set=1 THEN
1540 [OPT opt%
1550 LDR   y,ayo%
1560 STR   y,ay%
1570 ]
1580 ELSE
1590 [OPT opt%
1600 LDR   n,ayo%
1610 STR   n,ay%
1620 ]
1630 ENDIF
1640 [OPT  opt%
1650 MOV   yc,#vpix
1660 .rowloop%
1670 ]
1680 IF set=1 THEN
1690 [OPT opt%
1700 LDR   x,axo%
1710 STR   x,ax%
1720 ]
1730 ELSE
1740 [OPT opt%
1750 LDR   m,axo%
1760 STR   m,ax%
1770 ]
1780 ENDIF
1790 [OPT opt%
1800 MOV   xc,#hpix
1810 .colloop%
1820 ]
1830 IF set=2 THEN
1840 [OPT opt%
1850 MOV   x,#0
1860 MOV   y,#0
1870 ]
1880 ENDIF
1890 [OPT opt%
1900 MOV   cc,#1
1910 .cloop%
1920 FNsqu16(x,13,11,12,14)
1930 FNsqu16(y,10,11,12,14)
1940 ADD   R14,R13,R10
1950 CMP   R14,r
1960 BGE   gotcc%
1970 SUBS  R13,R13,R10
1980 RSBMI R13,R13,#0
1990 SUB   R13,R13,m
2000 FNmul16(x,y,10,11,12,14)
2010 ADD   y,R10,R10
2020 SUB   y,y,n
2030 MOV   x,R13
2040 ADD   cc,cc,#1
2050 CMP   cc,#M%
2060 BLE   cloop%
2070 MOV   cc,#1
2080 :
2090 .gotcc%
2100 SUB   cc,cc,#1
2110 ADR   R14,lut%
2120 LDRB  cc,[R14,cc]
2130 :
```

```
2140 LDRB  R14,[addr]
2150 TST   xc,#1
2160 ANDNE R14,R14,#15
2170 ORRNE R14,R14,cc,LSL #4
2180 ANDEQ R14,R14,#240
2190 ORREQ R14,R14,cc
2200 STRB  R14,[addr]
2210 :
2220 ADDNE addr,addr,#1
2230 ]IF set=1 THEN
2240 [OPT opt%
2250 LDR   y,ay%
2260 LDR   x,ax%
2270 LDR   R14,axi%
2280 ADD   x,x,R14
2290 STR   x,ax%
2300 SUBS  xc,xc,#1
2310 BGT   colloop%
2320 LDR   R14,ayi%
2330 ADD   y,y,R14
2340 STR   y,ay%
2350 ]
2360 ELSE
2370 [OPT opt%
2380 LDR   n,ay%
2390 LDR   m,ax%
2400 LDR   R14,axi%
2410 ADD   m,m,R14
2420 STR   m,ax%
2430 SUBS  xc,xc,#1
2440 BGT   colloop%
2450 LDR   R14,ayi%
2460 ADD   n,n,R14
2470 STR   n,ay%
2480 ]
2490 ENDIF
2500 [OPT opt%
2510 SUBS  yc,yc,#1
2520 BGT   rowloop%
2530 LDR   R13,asptemp%
2540 LDMFD R13!,{pc }
2550 .lut%
2560 EQUB 0
2570 ]
2580 FOR CL%=1 TO M%
2590 [OPT opt%
2600 EQUB  CL% MOD 15+1
2610 ]
2620 NEXT CL%
2630 NEXT opt%
2640 ENDPROC
2650 :
2660 DEF FNmul16(x%,a%,r%,u%,v%,w%)
2670 [OPT opt%
2680 MOVS  w%,a%,LSL #1
2690 RSBCS a%,a%,#0
2700 TEQ   x%,#0
2710 RSBMI r%,x%,#0
2720 ]
2730 IF r%<>x% THEN
2740 [OPT opt%
2750 MOVPL r%,x%
2760 ]
2770 ENDIF
2780 [OPT opt%
2790 MOV   w%,pc,LSR #31
2800 MOV   w%,w%,LSL #28
2810 TEQP  w%,pc,LSR #1
2820 MOV   w%,r%,LSR #16
2830 BIC   r%,r%,w%,LSL #16
2840 MOV   v%,a%,LSR #16
2850 BIC   a%,a%,v%,LSL #16
2860 MUL   u%,a%,r%
2870 TST   u%,#1<<15
2880 MOV   u%,u%,LSR #16
2890 ADDNE u%,u%,#1
2900 MLA   u%,v%,r%,u%
2910 MLA   u%,a%,w%,u%
2920 MUL   r%,v%,w%
2930 ADD   r%,u%,r%,LSL #16
2940 RSBVS r%,r%,#0
2950 ]
2960 =0
2970 :
2980 DEF FNsqu16(x%,r%,u%,v%,w%)
2990 [OPT opt%
3000 TEQ   x%,#0
3010 RSBMI r%,x%,#0
3020 ]
3030 IF r%<>x% THEN
3040 [OPT opt%
3050 MOVPL r%,x%
3060 ]
3070 ENDIF
3080 [OPT opt%
3090 MOV   w%,r%,LSR #16
3100 BIC   r%,r%,w%,LSL #16
3110 MUL   u%,r%,r%
3120 TST   u%,#1<<15
3130 MOV   u%,u%,LSR #16
3140 ADDNE u%,u%,#1
3150 MUL   v%,w%,r%
3160 ADD   u%,u%,v%,ASL #1
3170 MUL   r%,w%,w%
3180 ADD   r%,u%,r%,LSL #16
3190 ]
3200 =0
3210 :
3220 DEF FNvar(var)
3230 SYS "OS_ReadModeVariable",mode,var
TO ,,val
3240 =val
3250 :
3260 DATA 0,0,0
3270 DATA 192,0,240
3280 DATA 144,48,240
3290 DATA 96,96,240
3300 DATA 48,144,240
3310 DATA 0,192,240
3320 DATA 0,240,192
3330 DATA 48,240,144
3340 DATA 96,240,96
3350 DATA 144,240,48
3360 DATA 192,240,0
3370 DATA 240,192,0
3380 DATA 240,144,48
3390 DATA 240,96,96
3400 DATA 240,48,144
3410 DATA 240,0,192
```

Listing Info12

```
   10 REM     >Squiggle1 (Info12)
   20 REM By  Alan Beasley
   30 REM     From original game by Barr
y Wickett
   40 REM For 32-bit machines
   50 REM (c) BAU May 1993
   60 :
   70 PROCsetup
   80 REPEAT
   90 PROCinitialize
  100 PROCprompt("Player/Computer to sta
rt? Press P or C")
  110 char$=FNget("p","c")
  120 IF char$="p" THEN player%=1 ELSE p
layer%=2
  130 PROCprompt(STRING$(40," "))
  140 PROCkey_numbers
  150 REPEAT
  160 player%=3-player%
  170 PROCplay(player%)
  180 UNTIL winner%>0
  190 score%(winner%)+=1
  200 VDU 4
  210 COLOUR 1
  220 PRINT TAB(3,22); score%(1)
  230 PRINT TAB(34,22); score%(2)
  240 PROCprompt(name$(winner%)+" wins!
 Another game? (Y/N)")
  250 again$=FNget("y","n")
  260 UNTIL again$="n"
  270 MODE12
  280 END
  290 :
  300 DEF PROCplay(pl%)
  310 rx%=FNord(x%)
  320 ry%=FNord(y%)
  330 GCOL 3,3
  340 RECTANGLE FILL rx%,ry%,96,96
  350 MOVE BY -60,-32
  360 IF pl%=1 THEN
  370 VDU 67
  380 key%=FNcomputer
  390 ELSE
  400 VDU 80
  410 key%=FNplayer
  420 ENDIF
  430 PROCdraw(FNord(x%),FNord(y%),key%)
  440 board%(x%,y%)=key%
  450 REPEAT
  460 pd%=entrance(board%(x%,y%),pd%)
  470 x%+=ix%(pd%)
  480 y%+=iy%(pd%)
  490 off_board%=x%<1 OR y%<1 OR x%>8 OR
 y%>8
  500 home%=(x%=8 AND y%=9) OR (x%=9 AND
 y%=8)
  510 UNTIL board%(x%,y%)=0 OR off_board
%
  520 IF home% THEN
  530 winner%=pl%
  540 ELSE
  550 IF off_board% THEN winner%=3-pl%
  560 ENDIF
  570 ENDPROC
  580 :
  590 DEF PROCsetup
  600 MODE 1
  610 PROCreset
  620 COLOUR 0,0,100,100
  630 COLOUR 1,200,200,200
  640 COLOUR 2,0,0,100
  650 COLOUR 3,200,0,0
  660 DIM board%(9,9),ix%(4),iy%(4),entr
ance(3,4)
  670 DIM name$(2),keys%(2,4,3),score%(2
)
  680 FOR dir=1 TO 4
  690 READ ix%(dir), iy%(dir)
  700 NEXT dir
  710 FOR piece=1 TO 3
  720 FOR entrance=1 TO 4
  730 READ entrance(piece,entrance)
  740 NEXT entrance
  750 NEXT piece
  760 name$(1)="Computer"
  770 name$(2)="Player"
  780 FOR m%=1 TO 2
  790 FOR j%=1 TO 4
  800 FOR k%=1 TO 3
  810 READ keys%(m%,j%,k%)
  820 NEXT k%
  830 NEXT j%
  840 NEXT m%
  850 RECTANGLE 96,96,804,804
  860 GCOL 0,2
  870 RECTANGLE 92,92,812,812
  880 FOR piece=1 TO 3
  890 px%=FNord(.5+piece*2)
  900 py%=-12
  910 PROCdraw(px%,py%,piece)
  920 NEXT piece
  930 VDU5
  940 FOR n%=1 TO 2
  950 IF n%=1 THEN
  960 px%=0: py%=736
  970 ELSE
  980 px%=976: py%=676
  990 ENDIF
 1000 str$=name$(n%)+" score"
 1010 FOR p%=1 TO LEN(str$)
 1020 GCOL 0,1
 1030 MOVE px%,(py%-32*p%)
 1040 asc%=ASC(MID$(str$,p%,1))
 1050 VDU asc%
 1060 GCOL 0,3
 1070 MOVE BY -36,4
 1080 VDU asc%
 1090 NEXT p%
 1100 NEXT n%
 1110 ENDPROC
 1120 :
 1130 DEF PROCreset
 1140 VDU 26
 1150 ORIGIN 124,100
 1160 ENDPROC
 1170 :
 1180 DEF FNord(a)=(a*100) AND NOT 3
 1190 :
 1200 DEF PROCdraw(rx,ry,piece)
 1210 VDU 24,rx;ry;rx+96;ry+96;
 1220 GCOL 0,1
 1230 RECTANGLE FILL rx,ry,96,96
 1240 GCOL 0,2
 1250 RECTANGLE rx,ry,96,96
 1260 GCOL 0,3
 1270 FOR ix=0 TO 4 STEP 4
 1280 FOR iy=0 TO 4 STEP 4
 1290 CASE piece OF
 1300 WHEN 1:
 1310 CIRCLE rx+ix,ry+iy,50
 1320 CIRCLE rx+ix+96,ry+iy+96,50
 1330 WHEN 2:
 1340 LINE rx+ix,ry+iy+50,rx+ix+100,ry+i
y+50
 1350 LINE rx+ix+50,ry+iy,rx+ix+50,ry+iy
+100
 1360 WHEN 3:
 1370 CIRCLE rx+ix+96,ry+iy,50
 1380 CIRCLE rx+ix,ry+iy+96,51
 1390 ENDCASE
 1400 NEXT iy
 1410 NEXT ix
 1420 PROCreset
 1430 ENDPROC
 1440 :
 1450 DATA 0,-1,-1,0,0,1,1,0
 1460 DATA 4,3,2,1
 1470 DATA 1,2,3,4
 1480 DATA 2,1,4,3
 1490 DATA 1,2,3
 1500 DATA 1,2,3
 1510 DATA 3,2,1
 1520 DATA 3,2,1
 1530 DATA 3,2,1
 1540 DATA 3,2,1
 1550 DATA 1,2,3
 1560 DATA 1,2,3
 1570 :
 1580 DEF PROCinitialize
 1590 board%()=0
 1600 board%(1,1)=2: board%(8,8)=2
 1610 FOR x=1 TO 8
 1620 FOR y=1 TO 8
 1630 PROCdraw(FNord(x),FNord(y),board%(
x,y))
 1640 NEXT y
 1650 NEXT x
 1660 winner%=0
 1670 x%=2: y%=1: pd%=4
 1680 ENDPROC
 1690 :
 1700 DEF PROCprompt(s$)
 1710 VDU 4
 1720 COLOUR 1
 1730 tab%=20-(LEN(s$) DIV 2)
 1740 PRINT TAB(tab%,30) s$
 1750 VDU 5
 1760 ENDPROC
 1770 :
 1780 DEF PROCkey_numbers
 1790 FOR piece=1 TO 3
 1800 px%=FNord(.5+piece*2)
 1810 py%=-12
 1820 GCOL 0,3
 1830 MOVE px%+42,py%-32
 1840 VDU5,48+piece
 1850 GCOL 0,1
 1860 MOVE BY -36,4
 1870 VDU5,48+piece
 1880 NEXT piece
 1890 ENDPROC
 1900 :
 1910 DEF FNsafe(a%,b%,p%,k%)
 1920 board%(a%,b%)=k%
 1930 REPEAT
 1940 p%=entrance(board%(a%,b%),p%)
 1950 a%+=ix%(p%)
 1960 b%+=iy%(p%)
 1970 on_board%=(a%>0 AND a%<9 AND b%>0
AND b%<9)
 1980 home%=(a%=8 AND b%=9) OR (a%=9 AND
 b%=8)
 1990 UNTIL board%(a%,b%)=0 OR NOT on_bo
ard%
 2000 =on_board% OR home%
 2010 :
 2020 DEF FNget(a$,b$)
 2030 REPEAT
 2040 g$=CHR$(GET OR 32)
 2050 UNTIL g$=a$ OR g$=b$
 2060 =g$
 2070 :
 2080 DEF FNplayer
 2090 REPEAT
 2100 k%=GET-48
 2110 UNTIL k%>=1 AND k%<=3
 2120 =k%
 2130 :
 2140 DEF FNcomputer
 2150 PROCpause
 2160 IF RND(2)=1 THEN =FNcomp1 ELSE =FN
comp2
 2170 :
 2180 DEF PROCpause
 2190 time%=TIME+50
 2200 REPEAT UNTIL TIME=time%
 2210 ENDPROC
 2220 :
 2230 DEF FNcomp1
 2240 k%=RND(3)
 2250 try%=0
 2260 REPEAT
 2270 k%+=1
 2280 IF k%=4 THEN k%=1
 2290 try%+=1
 2300 UNTIL FNsafe(x%,y%,pd%,k%) OR try%
=3
 2310 =k%
 2320 :
 2330 DEF FNcomp2
 2340 try%=0
 2350 odd_moves%=(16-x%-y%) MOD 2 = 1
 2360 IF odd_moves% THEN m%=1 ELSE m%=2
 2370 REPEAT
 2380 try%+=1
 2390 k%=keys%(m%,pd%,try%)
 2400 UNTIL FNsafe(x%,y%,pd%,k%) OR try%
=3
 2410 =k%
```

Listing Info13

```
   10 REM     >Dancer (Info13)
   20 REM By  Mark Hobson
   30 REM For 32-bit machines
   40 REM (c) BAU May 1993
   50 :
   60 MODE 0:OFF
   70 h=10
   80 size=200
   90 E=.7
  100 g=-2
  110 D=size/h
  120 DIM v(h),w(h),x(h),y(h)
  130 bank=1
  140 REPEAT
  150  MOUSE x,y,b
  160  x1=x:y1=y
  170  FOR i=1 TO h
  180   dx=x(i)-x1+v(i)*E
  190   dy=y(i)-y1+w(i)*E
  200   d=D/SQR(dx*dx+dy*dy+.4)
  210   x1+=dx*d:x(i)=x1
  220   y1+=dy*d:y(i)=y1
  230   d=d/2-.5
  240   v(i)+=dx*d
  250   w(i)+=dy*d-g
  260   v(i-1)-=dx*d
  270   w(i-1)-=dy*d+g
  280  NEXT
  290  WAIT
  300  bank=3-bank
```

```
310 SYS 6,113,bank
320 SYS 6,112,3-bank
330 CLS
340 MOVE x,y
350 FOR i=1 TO h
360   DRAW x(i),y(i)
370 NEXT
380 CIRCLE x(h),y(h)+40,40
390 MOVE x(h),y(h)
400 DRAW x(h-6)+70,y(h-6)
410 DRAW x(h)+40,y(h-8)
420 MOVE x(h),y(h)
430 DRAW x(h-6)-70,y(h-6)
440 DRAW x(h)-40,y(h-8)
450 MOVE x,y
460 DRAW x(h-2)-50,y-(y(h-6)-y)-30
470 DRAW x(h-6)-30,y-(y(h)-y)-60
480 MOVE x,y
490 DRAW x(h-2)+50,y-(y(h-6)-y)-30
500 DRAW x(h-6)+30,y-(y(h)-y)-60
510 UNTIL FALSE
```

Listing Info14

```
10 REM     >Skater (Info14)
20 REM By  Mark Hobson
30 REM For 32-bit machines
40 REM (c) BAU May 1993
50 :
60 MODE0:OFF
70 h=10
80 size=200
90 E=.7
100 g=2
110 D=size/h
120 DIM v(h),w(h),x(h),y(h)
130 bank=1
140 MOUSE RECTANGLE -100,300+size,1479,1023
150 REPEAT
160   MOUSE x,y,B
170   x1=x:y1=y
180   IF y1>300+size MOUSE TO x,y-16:IF y<300 MOUSE x,300
190   FOR i=1 TO h
200   dx=x(i)-x1+v(i)*E
210   dy=y(i)-y1+w(i)*E
220   d=D/SQR(dx*dx+dy*dy+.4)
230   x1+=dx*d:x(i)=x1
240   y1+=dy*d:y(i)=y1
250   d=d/2-.5
260   v(i)+=dx*d
270   w(i)+=dy*d-g
280   v(i-1)-=dx*d
290   w(i-1)-=dy*d+g
300 NEXT
310 WAIT
320 bank=3-bank
330 SYS 6,113,bank
340 SYS 6,112,3-bank
350 CLS
360 MOVE x,y
370 FOR i=1 TO h
380   DRAW x(i),y(i)
390 NEXT
400 CIRCLE x,y+40,40
410 MOVE x,y
420 DRAW x(6)+70,y(6)
430 DRAW x+40,y(8)
440 MOVE x,y
450 DRAW x(6)-70,y(6)
460 DRAW x-40,y(8)
470 bx1=x(6)-30
480 by1=y(h)-(y-y(h))-60
490 bx2=x(6)+30
500 by2=y(h)-(y-y(h))-60
510 MOVE x(h),y(h)
520 DRAW x(2)-50,y(h)-(y(6)-y(h))-30
530 DRAW bx1,by1
540 MOVE x(h),y(h)
550 DRAW x(2)+50,y(h)-(y(6)-y(h))-30
560 DRAW bx2,by2
570 IF x<x(h) bx1=x:bx2=x(h) ELSE bx1=x(h):bx2=x
580 MOVE bx1-45,by1
590 DRAW bx2+45,by2
600 CIRCLE bx1-20,by1-16,16
610 CIRCLE bx2+20,by1-16,16
620 LINE 0,0,1279,0
630 RECTANGLE 600,0,80,150
640 UNTIL FALSE
```

BJÖRN AGAIN

Listing Pong

```
10 REM     >Pong
20 REM By  Fin Fahey
30 REM For 32-bit machines
40 REM (c) BAU May 1993
50 :
60 MODE 12:CLS:CLG:OFF:SOUND ON
70 DIM Chardat%(15,15)
80 FOR n=0 TO 12
90 FOR m=0 TO 14
100 READ Chardat%(n,m)
110 NEXT m
120 NEXT n
130 :
140 Gap%=600:Pad%=80:PSpeed%=10
150 Padlo%=(1000-Gap%)/2:Padhi%=Padlo%+Gap%-Pad%
160 Turn%=0:PROCEnd
170 :
180 WHILE 0=0
190 PROCGame
200 PROCScreen
210 PROCLoop
220 PROCEnd
230 ENDWHILE
240 :
250 REM Start Game
260 DEF PROCGame  BSpeed1%=0:BSpeed2%=0
270 Score1%=15:Score2%=15:Win%=0
280 PROCstart
290 ENDPROC
300 :
310 REM Main game loop
320 DEF PROCLoop  WHILE Score1%>0 AND Score2%>0
330 IF INKEY(-98) THEN PROCDown1
340 IF INKEY(-66) THEN PROCUp1
350 :
360 MOUSE x%,y%,But%
370 IF But%>3 THEN PROCUp2
380 IF But%=1 OR But%=3 THEN PROCDown2
390 :
400 PROCball
410 IF Win%<>0 THEN PROCNew
420 ENDWHILE
430 ENDPROC
440 :
450 REM Check score
460 DEF PROCNew   IF Win%=1 THEN
470 Col%=0:PROCscore1
480 Score1%=Score1%-1:Col%=1
490 PROCscore1
500 ELSE
510 Col%=0:PROCscore2
520 Score2%=Score2%-1:Col%=1
530 PROCscore2
540 ENDIF
550 GCOL 0:RECTANGLE FILL 8,8,8
560 PROCstart
570 ENDPROC
580 :
590 REM Animate Ball
600 DEF PROCball  GCOL 0:RECTANGLE FILL 8,8,8 TO Ballx%,Bally%
610 Win%=0:Chy%=0
620 Bally%=Bally%+Ballvy%:Ballx%=Ballx%+Ballvx%
630 :
640 IF Bally%<=30 THEN
650 Bally%=30:Ballvy%=-Ballvy%:Chy%=1:SOUND 1,-15,110,5
660 ELSE
670 IF Bally%>=999 THEN Bally%=999:Ballvy%=-Ballvy%:Chy%=1:SOUND 1,-15,110,5
680 ENDIF
690 :
700 IF Chy%=0 THEN
710 IF Ballx%<=400 THEN
720 IF POINT(Ballx%-8,Bally%)=7 THEN
730 Ballvx%=ABS(Ballvx%):tim%=tim%+1
740 IF Bally%>Padlo% AND Bally%<Padhi% THEN
750 Ballvy%=Ballvy%+SGN(Ballvy%)*BSpeed1%:SOUND 1,-15,80,5
760 IF tim%>8 THEN Ballvx%=Ballvx%+3:Ballvy%=Ballvy%+2:tim%=0
770 ELSE
780 SOUND 1,-15,110,5
790 ENDIF
800 ELSE
810 IF Ballx%<=40 THEN Win%=1:SOUND 1,-15,130,5
820 ENDIF
830 ENDIF
840 :
850 IF Ballx%>=624 THEN
860 IF POINT(Ballx%+8,Bally%)=7 THEN
870 Ballvx%=-(ABS(Ballvx%)):tim%=tim%+1
880 IF Bally%>Padlo% AND Bally%<Padhi% THEN
890 Ballvy%=Ballvy%+SGN(Ballvy%)*BSpeed2%:SOUND 1,-15,90,5
900 IF tim%>8 THEN Ballvx%=Ballvx%+3:Ballvy%=Ballvy%+2:tim%=0
910 ELSE
920 SOUND 1,-15,110,5
930 ENDIF
940 ELSE
950 IF Ballx%>=990 THEN Win%=-1:SOUND 1,-15,130,5
960 ENDIF
970 ENDIF
980 ENDIF
990 GCOL 7
1000 RECTANGLE FILL Ballx%,Bally%,8 TO 8,8
1010 IF Win%=0 THEN RECTANGLE FILL Ballx%,Bally%,8
1020 WAIT
1030 ENDPROC
1040 :
1050 REM Determine ball values
1060 DEF PROCstart Bally%=INT(RND(1)*800)+100:Ballvx%=0:Ballvy%=INT(RND(1)*3)+1
1070 IF Turn%=0 THEN Ballx%=400:Ballvx%=-INT(RND(1)*8)-3
1080 IF Turn%=1 THEN Ballx%=624:Ballvx%=INT(RND(1)*8)+3
1090 IF Turn%=1 THEN Turn%=0 ELSE Turn%=1
1100 ENDPROC
1110 :
1120 REM Move paddle 1 down
1130 DEF PROCDown1 IF Pad1%>Padlo% THEN
1140 GCOL 0:PROCpad1
1150 GCOL 7:Pad1%=Pad1%-PSpeed%
1160 PROCpad1
1170 IF BSpeed1%>-4 THEN BSpeed1%=BSpeed1%-2
1180 ENDIF
1190 ENDPROC
1200 :
1210 REM Move paddle 1 Up
1220 DEF PROCUp1 IF Pad1%<Padhi% THEN
1230 GCOL 0:PROCpad1
1240 GCOL 7:Pad1%=Pad1%+PSpeed%
1250 PROCpad1
1260 IF BSpeed1%<4 THEN BSpeed1%=BSpeed1%+2
1270 ENDIF
1280 ENDPROC
1290 :
1300 REM Move paddle 2 down
1310 DEF PROCDown2 IF Pad2%>Padlo% THEN
1320 GCOL 0:PROCpad2
1330 GCOL 7:Pad2%=Pad2%-PSpeed%
1340 PROCpad2
1350 IF BSpeed2%>-4 THEN BSpeed2%=BSpeed2%-2
1360 ENDIF
1370 ENDPROC
1380 :
1390 REM Move paddle 2 Up
1400 DEF PROCUp2   IF Pad2%<Padhi% THEN
1410 GCOL 0:PROCpad2
1420 GCOL 7:Pad2%=Pad2%+PSpeed%
1430 PROCpad2
1440 IF BSpeed2%<4 THEN BSpeed2%=BSpeed2%+2
1450 ENDIF
1460 ENDPROC
1470 :
1480 REM Draw screen
1490 DEF PROCScreen  CLS:CLG:Score1%=15:Score2%=15:GCOL 7
1500 y=0:PROCHor
1510 y=1000:PROCHor
1520 x=516:PROCVert
1530 :
1540 RECTANGLE FILL 96,0,8,(1000-Gap%)/2
1550 RECTANGLE FILL 96,500+Gap%/2,8,(1000-Gap%)/2
1560 :
1570 RECTANGLE FILL 936,0,8,(1000-Gap%)/2
1580 RECTANGLE FILL 936,500+Gap%/2,8,(1000-Gap%)/2
1590 :
1600 PROCscore1
1610 :
1620 PROCscore2
1630 Pad1%=400:Pad2%=400
1640 PROCpad1
1650 PROCpad2
1660 ENDPROC
1670 :
1680 REM Draw paddle 1
1690 DEF PROCpad1   RECTANGLE FILL 96,Pad1%,8,Pad%
1700 ENDPROC
1710 :
1720 REM Draw paddle 2
1730 DEF PROCpad2   RECTANGLE FILL 936,Pad2%,8,Pad%
1740 ENDPROC
1750 :
1760 REM Draw score 1
1770 DEF PROCscore1 score%=Score1%:x=430:y=920
1780 PROCNum2
1790 ENDPROC
1800 :
1810 REM Draw score 2
1820 DEF PROCscore2 score%=Score2%:x=530:y=920
1830 PROCNum2
1840 ENDPROC
1850 :
1860 REM Draw horizontal line
1870 DEF PROCHor FOR x=96 TO 928 STEP 32
1880 RECTANGLE FILL x,y,16,12
1890 NEXT x
1900 ENDPROC
1910 :
1920 REM Draw vertical line
1930 DEF PROCVert FOR y=0 TO 1024 STEP 32
1940 RECTANGLE FILL x,y,8,12
1950 NEXT y
1960 ENDPROC
1970 :
1980 REM Draw two digit score
1990 DEF PROCNum2 num1%=INT(score%/10):num2%=score%-num1%*10
2000 GCOL 0:RECTANGLE FILL x,y,66,40:GCOL 7
2010 IF num1%<>0 THEN num%=num1%:PROCNum
2020 x=x+36:num%=num2%:PROCNum
2030 ENDPROC
2040 :
2050 REM Draw one digit
2060 DEF PROCNum b%=0
2070 FOR n=0 TO 2
2080 FOR m=0 TO 4
2090 IF Chardat%(num%,b%)=1 THEN
2100 RECTANGLE FILL x+10*n*scale,y+8*m*scale,8*(scale+z%),6*(scale+z%)
2110 ENDIF
2120 b%=b%+1
2130 NEXT m
2140 NEXT n
2150 ENDPROC
2160 :
2170 REM Make big pong
2180 DEF PROCPong scale=4:z%=1:x=400:y=500:num%=10:PROCNum
2190 x=550:y=500:num%=0:PROCNum
2200 x=700:y=500:num%=11:PROCNum
2210 x=850:y=500:num%=12:PROCNum
2220 scale=1:z%=0
2230 ENDPROC
2240 :
2250 REM Waiting to play
2260 DEF PROCEnd CLS:CLG:But%=0
2270 WHILE But%=0
2280 GCOL 7:PROCPong
2290 GCOL 0:FOR n=0 TO 15000:NEXT n
2300 PROCPong:FOR n=0 TO 15000:NEXT n
2310 MOUSE x%,y%,But%
2320 ENDWHILE
2330 ENDPROC
2340 :
2350 REM data for characters
2360 DATA 1,1,1,1,1,1,0,0,0,1,1,1,1,1,1
2370 DATA 0,0,0,0,0,1,1,1,1,1,0,0,0,0,0
2380 DATA 1,1,1,0,1,1,0,1,0,1,1,0,1,1,1
2390 DATA 1,0,0,0,1,1,0,1,0,1,1,1,1,1,1
2400 DATA 0,1,1,1,1,1,0,0,0,0,1,0,0,0,0
2410 :
2420 DATA 1,0,1,1,1,1,0,1,0,1,1,1,1,0,1
2430 DATA 1,1,1,1,1,1,0,1,0,1,1,1,0,0
2440 DATA 0,0,0,0,1,0,0,0,0,1,1,1,1,1,1
2450 DATA 1,1,1,1,1,1,0,1,0,1,1,1,1,1,1
2460 DATA 0,0,1,1,1,0,0,1,0,1,1,1,1,1,1
2470 :
2480 DATA 1,1,1,1,1,0,0,1,0,1,0,0,1,1,1
2490 DATA 1,1,1,1,1,0,1,1,1,0,1,1,1,1,1
2500 DATA 1,1,1,1,1,1,0,0,0,1,1,1,0,0,1
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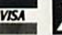
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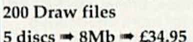
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ACORN USER ADVERTISEMENT PAGES MAY 1993

THE MOXON INTERVIEW

IAN GOODALL

'Within hours of the release of the new Acorn range, I said to the design team: "We make high quality upgrades for Acorn computers; that's true. But you guys aren't going to have much to do if we don't design something to allow the new machines to take more than one card." That's how the Ultimate Expansion System was born.'

Ian Goodall, the man responsible for HCCS' product sales and marketing, doesn't pretend that having a product strategy is vital: 'They realised this was a serious point: we sell upgrades for Acorns, and as the new machines can only take one expansion card, we were seriously jeopardising our long-term future as a hardware manufacturer.

'We had a long meeting, and the team decided it was possible to design an expansion system which would be contained completely inside the machine, as long as the problems of cooling and power supply could be overcome. The designing of credit card sized micropodules was the key, with a standard d-type connector for every podule to allow them to slot in easily.'

The result of the Newcastle-based team's efforts is the Ultimate Expansion System, which may well become the standard expansion route for owners of the new range, as well as older machines.

'We started off by designing the multipodule for the A3010, which has a hard disc and two slots for micro podules. This was closely followed by the A3020 and A4000 versions, though at this point we'd not actually seen an A4000. They were that rare.

'Finally we made a strategic decision to produce a version for the A5000, so that micropodules are the only expansion cards for the Archimedes that will fit in all the machines in the range (except the A4). '



Indeed. The coupling of a market-driven product philosophy and a team of technical designers has meant HCCS has released some pretty innovative products.

'In 1991, when I was working for Kelator, Acorn's main distributor at the time, I saw it would be beneficial to broaden the available product range with a video digitiser, and HCCS had designed one for the BBC some years before.

'As a result, HCCS designed and built a digitiser to compete with Wild Vision's Hawk V9, and it sold reasonably well. However, having got into the digitiser market, HCCS' design team saw the possibility of a high-performance, low-cost, real time digitiser with the software mainly on disc, cutting the cost of the product.

'The decision was taken to bring out a monochrome version of the add-on, at a cost to appeal to those people who might not know they wanted a digitiser. The increase in camcorder sales gave us confidence, and next the monochrome Vision digitiser was launched in January 1992 at a price of £49.

'A colour version soon appeared for £79, and a high resolution digitiser called HiVision followed at £129.

'At the October *Acorn User* show we managed to sell 300 digitiser units in just three days, which was fine, except for the fact that we had only had 200 units at the show. It was obvious by the Saturday morning that we were going to sell out, so we manufactured another 100 and brought them down on Sunday.'

Accelerating sales curves seem to prove Ian's point: decide on a market and go for it. It worked for Computer Concepts with *Impression* and *ArtWorks*, and it's working for HCCS. Maybe that's why the Acorn marketplace is awash with new products this spring.

NEXT MONTH

Buying a new application can sometimes be a tough and time-consuming decision. With new packages – and upgrades – coming on the market little by little, it is often difficult to make a direct comparison. Which is why *Acorn User* has decided to step into the breach.

Our new buyer's guides will look at major packages in a certain field and compare the results. Price, ease of use and, of course, the features they provide, will all be assessed by an experienced reviewer.

The first buyer's guide will take a look at graphics, so if you want to see the real state-of-the-art in the Acorn world, don't miss our June issue.

THE LATEST RELEASES

One package that should be of interest to home users, and may also find a home in many geography classrooms is *Topographer*, an application that can turn a humdrum map into a three-dimensional landscape.

For teachers, and parents, we have a special round-up next month, with a 'back to nature' feel. *Woodlands*, *Badger Trails*, *Creepy Crawlies* and *Living Birds* are just some of the packages that signify a growing interest in wildlife and the environment. On a more scientific bent, Computer Aided Design comes in many guises, and *ProCAD* strives to take the professional approach. But how does it fare against the most well-known CAD package of them all: *AutoCAD* on the PC.?

And finally, something that will appeal to all those on the upgrade trail is our special look at Ram upgrades. When you are short on memory space, the benefits are all too clear, but which is the best buy?

THE BEST ADVICE

Next month's issue will – as always – be packed full of advice, tips and techniques.

Our music series will explain how programmers can use the Arc's amazing sonic abilities to best advantage, while a brand new series starts you on the road to designing fast 3D graphics.

Marvel at the quotidian zanyness of *INFO, with contributions from all over the globe, and dig into our brand new series of hints and tips.

DAN BURTON

TECHNODREAM



TECHNODREAM

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